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Clinical Lectures.

ARTICLE I.

CEREBRAL MENINGITIS. A Clinical Lecture by JAMES HUTCHINSON, M.D., of Maine.

This woman is 31 years of age, and was admitted on the 4th of February, 1879. Her father died of consumption, and one of her sisters of paralysis, but the rest of her family history, as far as it can be obtained, is good. Her mother says that she has been subject to convulsions since she was three years old, and that she began to show evidence of scrofula when quite a young girl. She has had frequent abscesses situated upon her extremities and trunk, from each of which dead bone has been discharged. Her mother also states that when she was 14 years old, and was living on a plantation in Virginia, she was attacked by her master on one occasion when he returned home much intoxicated, and was almost killed. She succeeded in making her escape from him, when it was discovered that her right shoulder was dislocated and that there was a subluxation of the left knee joint. She was so badly beaten and bruised that she was obliged to keep to her bed for a year afterwards. Her knees,

according to her mother's account, only began to swell after she was beaten. Since that time the convulsions, so-called, have been more frequent. Menstruation began at the age of 21, and has been very irregularly performed ever since. She has suffered much from dysmenorrhœa. The convulsions are much more frequent at the menstrual periods but are by no means confined to those times. In the winter of 1875–76, she had a succession of chills, followed by cough and expectoration, which was first tenacious and yellowish, but afterward muco-purulent and blood-stained. She had one or two slight hæmorrhages. She then suffered from headache, vertigo and faintness for about a week. Soon after this, while sitting at table, she fell to the floor unconscious, and remained so all day. She had no actual convulsion nor did she foam at the mouth. She was completely aphasic upon recovering consciousness. Her head was turned slightly to the left and rigidly held there. The left arm and leg were also rigid and powerless. The right hand was also slightly affected, and there was some rigidity of the right knee. There was also divergent strabismus of the right eye, with diplopia and flashes of light before the eyes. In one week the power of speech returned, and in the course of one month she had regained the power of motion in the right arm and leg and in the left arm. At this time the patient's bowels were constipated and there was retention of urine requiring catheterization. In the summer of 1876 she had anorexia, nausea and vomiting, and great pain in the abdomen which was very sensitive to pressure. She also had headache. About December, 1876, she had two copious hæmorrhages from the lungs. Soon afterward her articulation became imperfect, and in February, 1879, she had a violent convulsion which came on during sleep. On this occasion she foamed at the mouth and lacerated her tongue severely. She was unconscious for some hours, and upon recovering was again completely aphasic, and had paralysis of the muscles of deglutition, which lasted for one week and necessitated the use of nutritious enemata. There was no paralysis or rigidity of the muscles of the limbs or face, but her vision became much more indistinct than before. After this attack she was in bed about three months and during that time she was constipated and had occa-

sional retention of urine. The pain in her abdomen also returned after this attack. In August, 1877, she was admitted to this hospital, suffering from abscess in the side. While in the hospital she had a convulsion in which she foamed at the mouth and bit her tongue. After this she had aphasia for a short time. Three months later she had a fourth convulsion, and has been confined to her bed almost ever since. The abdominal pain returned after each of her last convulsions, and upon admission is still present. She denies all venereal taint, though she has suffered from sore throat. She has had a vaginal discharge for a long time. Upon her second admission the patient is quite thin and her body and legs are covered with cicatrices, the seats of former abscesses, but upon the left leg are several shining superficial scars. There are also signs of old synovitis of the right knee, and the ligaments of the left knee are very lax, allowing great freedom of motion of the leg in every direction. The middle finger of the left hand has its distal articulation semi-dislocated. There is divergent strabismus of the right eye. There is some dullness over the right chest posteriorly. The respiratory sounds are feeble and there is a trace of ægophony. The urine is acid; sp. gr., 1018; no albumen.

CLINICAL RECORD.

February 5. Ordered mist. gent. comp. fℨss. t. d. Patient had an attack last night, which lasted but a short time, in which she became unconscious without any convulsion.

February 10. Ordered potass. iod. gr. x. t. d. and mist. gent. comp. dropped.

February 12. There is a dwindling of the right leg below the knee. The right calf measures ten and three-fourths inches, and the left calf twelve and a half inches.

February 13. Patient complains of pain upon micturition. Vaginal examination reveals a prolapse of the womb and considerable leucorrhœa. Ordered injection of alum (gr. xxx to Oj of water).

February 17. Ophthalmoscopic examination reveals atrophy of the discs, the result of former choking.

February 18. Considerable pain in abdomen.

February 19. Patient says that she passes blood by stool. Once or twice during the past two weeks she seemed to have lost the power of articulation for an hour or two at a time (she has never lost consciousness at these periods), and when she has regained speech has stated that she had severe pain over the region of the heart.

February 20. Patient is rapidly improving. The strabismus is much less marked.

February 21. Ordered ol. morrhuæ, fʒss t. d. Iodide continued.

February 30. Convalescing rapidly.

POST-MORTEM EVIDENCES OF DISEASE IN CEREBRO-SPINAL MENINGITIS.—Rigor mortis marked. Posterior and lateral surfaces of body marked with livid spots of various sizes; also anterior surfaces of both arms and upper part of both forearms and knees exhibited little clusters of punctate spots, each of the size of the head of a small pin; some over the free border of the ribs on the right side. The peritoneum, and all the serous membranes exposed, presented a very deep, almost violet color. The pericardium contained a drachm of clear serum; membrane normal. The heart weighed three ounces and one-half; valves normal, right ventricle of auricle contained white clots; left ventricle contained fluid blood. The left pleural cavity contained some old adhesions at the base of the lung. The left lung weighed four and one-half ounces; hypostatic congestion of the lower lobe; crepitated throughout; diaphragmatic pleurisy. The right lung weighed five and one-half ounces, crepitated throughout. The liver weighed thirty ounces, was congested, and softer than normal. The right kidney weighed two ounces, the left two and one-half ounces, rather soft; cortex looked fatty, no irregularity in markings. The brain weighed two pounds and fourteen ounces; intensely congested, and in meshes of pia mater were collections of purulent material. The blood-vessels, after opening the dura mater of the cord, were found distended with blood, and in the meshes of the pia were collections of pus.—*N. Y. Med. Record.*

Original Communications.

ARTICLE II.

ADVANCEMENT OF THE RECTUS. By A. E. PRINCE, M.D.*

The operation of advancement of the rectus, from the crude state in which it was first proposed by Guérin (1849), has been improved and rendered more exact by many, among whom may be mentioned the names of Von Graefe, Critchett, Lebreich, Snellen, Knapp, Wecker, Pannus, Agnew, Noyes, Green and others, who have written upon the subject.

Yet the operation has hitherto remained imperfect on account of the difficulty of calculating the result in a given case, and the want of what may be called *adjustability*, rendering the operation incapable of being subsequently modified. It has hence always been regarded as a difficult and unsatisfactory operation rarely employed except in the most aggravated cases.

Though the limit of our space prevents a historic analysis of the progress of the operation, the introduction of Wecker's double-hook, one branch of which is designed to be inserted beneath the tendon, while the other slides down upon it from above, is worthy of special mention, for by thus securing the tendon until after the insertion of the sutures, the execution is freed from danger and greatly facilitated; though by his peculiar stitch, the tendency to split the muscle—or displace it upward or downward—or cause a slough of the strangulated area between the sutures and the cornea, is so great as to constitute insurmountable objections to the method.

The two pre-requisites of a typical advancement operation, are—1st. Avoidance of the tendency on the part of the stitch to

* Reprinted from the *St. Louis Medical and Surgical Journal.*

divide the fasciculii and split the theca of the R. muscle, allowing it to retract, thus compromising or nullifying the effect, or even making the case worse. 2. A desideratum which has formerly received but little or no attention, is that of enabling the operator to *modify at will the effect of the operation after* recovery from the anæsthetic, and when the elastic tension and muscular contractility have returned.

The first of these indications is met by the loop-suture.

The second, by the *double loop suture* as employed in the following operation, which, while it seems to combine the advantages of other operations, avoids their objectionable features.

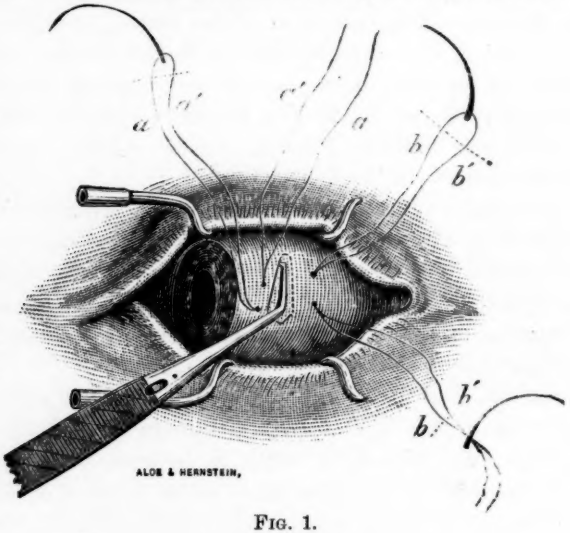

FIG. 1.

OPERATION.

The patient being asleep and speculum introduced, a fold of conjunctiva over the insertion of the tendon of the muscle to be advanced is grasped with the fixation forceps and elevated. A needle armed with a salicylized silk suture* is passed through

* The salicylized suture is prepared by immersing the silk on the spool in a solution of salicylic acid 1 part, alcohol 9 parts, glycerine 1 part; the end of the thread being allowed to protrude through a notch in the cork; thus it can be drawn out and cut off as wanted.

On evaporation of the alcohol, the glycerine retains the acid and keeps the suture damp and pliable. Such suture is no more irritating than the silver, until after the acid is dissolved, and is especially favorable when the cutting out of a suture is objectionable.

the elevated conjunctiva, parallel to and about two or three m.m. from the corneal-margin, after which the needles are cut off, making two loop sutures, as represented in the fig. (a) and (a').

A small opening through the conjunctiva and Tenon's capsule below and opposite the insertion of the tendon to be advanced is then made in the usual manner to admit of the introduction of one branch of Wecker's double hook or appropriate forceps,* which is passed underneath the tendon and drawn tense when the remaining branch is lowered upon the conjunctiva including tendon and cellular tissue.

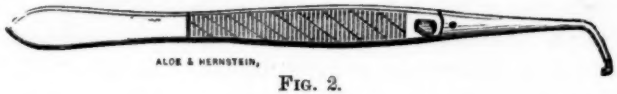

FIG. 2.

This done, the tendon with conjunctiva is separated from the ball at its insertion, by the introduction of one blade of the scissors through the opening previously made.

Lifting the detached tendon from the ball by means of the forceps, the needles, carrying the *double-loop suture* are introduced from within outward through muscle and conjunctiva, as indicated (b) (b'); the position of the points of puncture depending on the effect desired. This step is facilitated by arranging the needle holder to carry both needles at once, which is important when no anæsthetic is employed, for the requisite time is thereby reduced to about two minutes.

Upon the introduction of the sutures the forceps is to be liberated by separating the contused tendon and conjunctiva, with scissors along the dotted line to the right in the figure, the needles being cut off as indicated.

A subconjunctival division of the opposite tendon having been made at the commencement when necessary, the advancement is accomplished by isolating and twisting sutures (a) and (b) which form secure loops, respectively through conjunctiva and muscle. The parts being cleared of blood, a knot is formed and drawn until the tendon is deemed sufficiently advanced, when it is secured by a simple bow. The conjunctival gap will have simultaneously been closed. After recovery from the anæsthetic,

* For forceps, address Aloe, Hernstein & Co., 300 N. Fourth street, St. Louis, Mo.

and upon the return of the muscular tonicity an examination is made to ascertain the success of the operation. The patient being directed to fix some object, there should be no motion upon alternately covering either eye.

If this be the case the remaining sutures (a′) and (b′), after some hours should be withdrawn. Should the effect not have been sufficient, the sutures (a) and (b) are to be still farther tightened, as much as may be necessary to give parallelism to the eyes, and the knot secured, sometime after which the remaining sutures (a′) and (b′) are to be removed as before. Should, on the contrary, the effect of the operation have been too great, the stitch may be loosened or cut with the scissors and removed, the tendon allowed to retract, and the remaining reserve sutures (a′) and (b′) brought into requisition, twisted, formed into a knot, and sufficiently drawn to make the effect of the operation perfect.

The stitch may be allowed to remain until it becomes loose when it can be removed without pain.

The occasions for performing this operation, though quite numerous, may be naturally arranged in six classes.

1. Paretic and paralytic affections, where the muscular contractility cannot be calculated.

2. In case of over correction from a previous operation either from faulty operation, the muscle having been divided outside of the capsule, or in case of squint due to hypermetropia, the correction of which would have corrected the strabismus. When such eyes are straightened and the person subsequently uses glasses, the eye deviates in the opposite direction as much as it would originally have been corrected by glasses.

3. In case of strabismus of one eye exceeding 15° the muscular relations of the other eye being normal. In such cases one should confine the operation to the deviating eye, dividing one R. and advancing the opposite.

4. When both eyes deviate, amounting together to more than 30° after H. has been corrected. In such cases it is known that simple division of both R. Interni rarely suffices. A preparation for an advancement on the side of the greater deviation should be made, and the strabismus a little over corrected to meet the

cicatricial contraction of the two opposing muscles, thus accomplishing in one operation what is seldom a perfect success after several.

5. In case of a slight deviation, where we fear a simple division would produce an over correction. We should employ the advancement stitch to limit the effect of the division.

6. In case of binocular diplopia, this operation on account of its *adjustability*, is rendered especially applicable.

In order to put in practice the above, the reader must be familiar with the method of measuring strabismus by *degrees*, which alone seems the rational method of designating a deviation in the arc of a circle; and besides, the measurement in degrees, as will be conceded, is the easier and more accurate manner of determining the amount of deviation in any case of squint.

The observer should be provided with a perimeter or graduated semicircle, of from 15—18 in. radius; the degrees being numbered from the center toward the extremities and mounted upon a pedestal which will allow of various degrees of elevation, that it may be placed upon the same level with the eyes of different persons. The deviating eye is placed at the center of the diameter and the patient directed to look at the zero of the semicircle at which is placed a small colored disc, for a fixation object. If now a candle be placed immediately behind the zero point, and the observer's eye directly behind this; where no deviation exists, the image of the flame will be seen in the center of each pupil. Should the eye deviate the image will appear at some other point than the pupillary center. While the non-squinting eye continues to be fixed on zero, both candle and eye of the observer are to be simultaneously moved along the arc until the point is found, when the image of the candle flame is seen in the middle of the pupil. This point marks the corneal axis; and since the corneal and optical axes are approximately the same, this is the degree of deviation. When a still more accurate measurement is deemed desirable, it may be accomplished by ascertaining the angle A. It will frequently be found that when the optical axis is directed to zero, the corneal axis may deviate several degrees, which is found by moving the candle until the image is seen in the center of the pupil. The angle of inclination of these two axes, called

by common consent among oculists, angle A, is frequently large, causing persons to appear to have an external deviation, when really binocular vision exists. In such cases the optical axis cuts the cornea to the inner side of its zenith, when the angle is called positive, and should such persons have internal strabismus, the angle A of each eye should be added to, and in external, subtracted from the results of the former approximate measurements, which will usually be found sufficiently accurate. For this excellent and simple method we are indebted to Snellen of Utrecht, and Londolt of Paris,* in whose clinics alone the author has seen it employed; and it is hoped that the knowledge of such an admirable device will become more generally disseminated; for accurate measurements are essential to success, whether by the simple division operations or in cases where an advancement is indicated.

A few selected cases from our case-book will illustrate the above theoretical consideration, and serve to show the obstacles met with in some rare and difficult cases.

† No. 1016. Mr. A., aged 45, after correction of H. concomitant S=35°, external motion quite limited. R. E. V=$\frac{20}{30}$, L. E. $\frac{20}{200}$. Seen through ground glass which prevents fixation, both eyes deviate about equally. Divided both internal tendons and introduced the advancement stitch for external R. of L. E.

The external muscles being quite weak found it necessary to advance to a considerable degree.

No. 1143. Master J., aged 12 years, concomitant S. 45° since infancy. No H., L. E. V=$\frac{20}{20}$, R. E., counts fingers at three feet. Division of both internal recti—and advancement of R. E. of the left. No difficulties.

No. 1329. Miss L., aged 18, concomitant alternating S. since 18 months of age, 50°. H=1.5 D (+ $\frac{1}{24}$), after the correction of which S=40°.

External motion of L. E. more limited than R. Divided both R. I. and advanced R. E. of the L. E. This not being sufficient, loosened the knot and advanced until perfect. No difficulty.

* Handbuch der Augenheilkunde. Graefe and Saemisch, Vol. III, p. 233. The author employs a tangent to a circle in place of the regular perimeter.

† Above abbreviations. H=Hypermetropia; S=Strabismus; R. E.=right eye; L. E. = left eye; V=acuteness of vision; D=dioptric; R. E.=Rectus Externus; R. I.=Rectus Internus.

No. 1414. Miss P., aged 15, internal squint 50° Hn=0, V=$\frac{20}{30}$ for each eye.

External motion much limited in case of each eye, indicating a relative weak condition of both externi. Found it necessary to divide both interni and advance both externi. Cosmetic effect perfect, the latter R. E. being advanced by a second operation. Theoretically both R. E. should have been advanced at the first operation, but the necessity for the second operation is but testimony in favor of the rule—which, had it been followed, would have led to a perfect operation the first time.

No. 1370. Madame D., aged 42. When a child had both R. I. divided for internal S. In place of the tendon, the muscle was divided outside of the capsule of Tenon, and both retracted in the orbit. The external recti operating without any counter-force, an extreme external deviation was the result, amounting to 60° (35° in one eye and 25° in case of the other). It was deemed advisable to attempt an operation, though without much expectation of success. The external recti were accordingly divided, and to increase the liberty toward internal motion, the capsule was split meridianally above and below the muscles which were found to be exceedingly strong. No attachments were found internally, and no muscular fibers. Nothing except the most atrophied conjunctiva. Into this the double-loop suture was placed and the knot tightened to its limit. The temporary result was admirable. For a week there remained a slight internal strabismus which finally became converted into a slight deviation outward (15°), for which a second operation was not considered advisable. This case taught the important lesson exemplified in the next case, viz., that when it is a case of total paralysis, or due to complete separation of the muscle from the eye, the opposite muscle should be divided entirely outside of the capsule of Tenon, that it may be free to retract in the orbit, and exert no more influence on the eye than its paralyzed opponent. When such eye is straightened, we can of course expect only a limited amount of motion.

No. 1546. Mrs. B., *colored*, aged 26, congenital paralysis of third pair, implying loss of power over the superior, inferior and internal rectus, the inferior oblique and levator palpebræ superioris, which last was but partially affected.

The result of this is an external deviation of each eye of 50°, making a combined external strabismus of 100° with immobility of the eyes.

But a small portion of the pupil could be seen in the extreme external canthus of each eye, and when vision was attempted the head was held to the right or left, according to which eye was employed in vision, this being $\frac{20}{60}$ with each eye.

This being the most extreme case which had come to our notice, it gave us an excellent opportunity to test the merits of our operation, which worked according to programme, as will be shown by a photograph illustrating the condition, before and after the operation, and which will be mailed to any one upon receipt of stamp. The condition of partial ptosis remains to be corrected, the photographic views having been taken during artificial suspension of the lids.

From the above it will appear that the range of usefulness of an adequate advancement operation is by no means small, embracing some low and all the high degrees of strabismus, and especially such desperate cases as the above, and when we consider the small proportion of extreme cases heretofore attended by complete cosmetic success, and the large number requiring repeated operation, no apology will be necessary for bringing to the notice of the profession an operation whose *facility of execution*, *security* and *adjustability*, it is conceived, will assist in placing the correction of strabismus upon a basis approximating universal success.

ARTICLE III.

THE ETIOLOGY AND TREATMENT OF INEBRIETY. By Dr. CHAS. WARRINGTON EARLE, Physician to the Washingtonian Home, and Prof. Diseases of Childred, Women's Medical College, Chicago.

During the past ten years the writer has had unusual opportunities for investigating the causes of inebriety, as assigned by the men themselves. The results of treatment in the Washingtonian Home of this city have been noted, and the deficiencies, especially the want of a proper place for what I denominate the "third class," have been fully appreciated. Some of these reflec-

tions and conclusions, it appears to the writer, may be of some value to the medical profession.

In the first place, then, why do men commence the use of stimulants?

Second. After periods of reformation why do men again commence the use of alcoholics? and,

Third. How shall we treat them?

We are in medicine constantly speaking of the cause of certain phenomena, and, having found it, it comes to be an every-day expression in the treatment of patients, "Do away with the cause;" and so at the outset comes the question, "Why do men commence to drink stimulants?"

Answers based upon actual questions to many hundreds, and extensive observation, authorize me in saying, in regard to the

FIRST CAUSES OF DRINKING,

that association with drinking companions stands at the head of the list—forty per cent. giving this as the primary cause of deviation from a temperate life. In the majority of these cases the habit commenced in youth, and the particular stimulant used was *beer*, or whisky considerably diluted and flavored. It is the mild alcoholic at first, generally changed to the stronger as the appetite becomes accustomed and demands them.

Sociability comes next on the list, *ten* per cent. giving this as the reason. The custom of "treating," as it is called, is regarded as an evidence of sociability, and, in certain classes, is carried to a great extent. The first in a group of friends orders a particular alcoholic, and it is not strict sociability until all have imitated the example.

Trouble of various kinds, either in business or in the family, is assigned in ten per cent. of the cases. It will be observed, however, that after the habit is formed trouble of any character will, in a *greater* number of cases, be given as a cause of relapses.

The custom of drinking in families, so common a half century ago, seems to influence but few, and it is hoped that the time is not far distant when it will cease to be a cause. *Two per cent. only* acquire this habit in their homes. As a first cause

this habit cannot be too strongly condemned, and the people need education particularly on this subject. I am inclined to think that a much larger number owe the formation of an appetite to this cause than my figures seem to show. I frequently have to expostulate and condemn the practice, especially in those families where beer or wine is used to some extent. A few drops are given to the children. This I have noticed in some of the best foreign families whom I attend, and that it is regarded in the least dangerous to the future welfare of their children is quite a matter of surprise to the parents. As I remarked before, they need education in regard to it. Let them know the facts, and they will stop it.

Different kinds of business, which bring a person in contact with various kinds of alcoholics, has been a temptation but few can stand, and those engaged in the liquor traffic and in the hotel business sooner or later contract the habit, although a few, beginning to feel its effect in their own bodies, or noticing it in others, stop, and are temperate men.

Mental depression and active brain work are not frequent causes until after the habit is once formed.

Many young men, and a few of riper years, date the commencement of drinking habits to *army and navy associations*. During the war of the Rebellion many of the present generation were called from the restraining influences of home to share the vicissitudes of camp life and the excitement of the battle-field. It was at a time when they were forming habits for good or evil, and it can hardly be regarded with surprise that some contracted the habit of using alcoholic stimulants, which has followed them to this day. About *ten per cent.* give this as the first cause of their drinking. The habit is contracted at college by a few, and a great variety of excuses are given by others as the first cause of their drinking. A natural love for liquor is claimed by a few—exhaustion, poor health, sickness, etc., etc., are also cited as reasons.

I am thoroughly convinced that the great majority of boys and young men commence the use of alcoholics without the least idea that it is a dangerous practice. At first it is social; the preparations are agreeable to the taste, and the effect at this time, from

the fact that only a small amount is taken, is not perceptible. What the youth of our country need is education as regards the properties, and particularly the effects, of all kinds of alcoholics on the human system. It should be understood by every youth that the moderate use of mild alcoholics is not only exceedingly dangerous, but in a large number of cases, from causes from which I will presently enumerate, is absolutely ruinous. They should be taught to handle it as they handle aconite or arsenic.

I need not say here, for you will notice all through my paper that I believe that our only hope is in the education of the young. The great mass of those addicted to the intemperate use of liquor to-day will never be temperate citizens. Many of them will have spasmodic periods of teetotalism, only to succumb to the appetite, and for a time lapse into their former habits.

This brings me then, to speak of

RELAPSES,

or to consider the "Second Part" of my subject.

After periods of reformation, why do men relapse into former habits?

Unfortunately many who have apparently commenced a successful reformation begin to drink again. This unfortunate circumstance on the part of men who have stood up well for years causes, I think, more anxiety and discouragement than anything else connected with the treatment of inebriates.

It is not a difficult thing, after a period of intoxication, with the disgrace and physical infirmities conspicuously present to one's own self to induce the victim of this unfortunate habit to abstain from further drinking for perhaps several months, but many, as I remark above, again drink. To these men the question propounded has been, "What reason do you assign for drinking since you attempted reformation?" In the main I believe, as I do in regard to the reply given to my first question, that the answers are conscientiously and truthfully given. In the majority of cases it is a subject which has been seriously and carefully contemplated. The young man who is forming the habit of drinking, surrounded by gay companions, and taking the mild alcoholics, does not give the subject of reformation a thought; but

when a person begins to feel the power of the stimulant over him, and especially after he has lost his business and ruined his family, he reviews with great earnestness the causes of his relapse.

At the head of the list must be placed *trouble*. After the man has once formed the habit, the moment trouble comes, either in his family or in his business, or from grief at the loss of friends, or in disappointment at the loss of position, the unhappy man rushes for some variety of alcoholic stimulant. The man does this, too, fully realizing what it will do for him. It is the sheerest nonsense to say that he cannot help it. He does not want to help it. What he *does* want is to become oblivious to his trouble, and he knows that alcohol will produce this desired condition. Alcohol is one of the anæsthetics, and under its influence trouble, and sorrow, and disappointment are forgotten. *Sixty per cent.* of our relapses come fairly under this category.

Dissolute and wicked companions, either male or female, rank second in the causes of relapse. The young man just contracting the habit does not usually associate with men who are absolutely stained with crime, and he may continue for years to occupy his position in good society, and may enjoy to a considerable degree the confidence of his friends. Sooner or later, however, he commences to fall into bad company, and by the time his attention has been directed to any reformatory measures he has been discarded by many of his friends, and he has become the associate of the dissolute and outcast of the earth. A man of this character, who from any cause has had his attention directed toward reformation, always finds it a hard task to accomplish. Everybody, except his evil companions, has lost all confidence in him, and however well he may do, it is with great difficulty that his friends are induced to assist him in the least. They have long since ceased to give him more than a passing thought, and he is ostracised by all save his boon companions. It seems cruel that a man, under almost any circumstances, can procure a drink from a saloon-keeper, while the same individual, when trying to gain a foot-hold after the commencement of a reformation, *cannot get a cup of coffee*, and *hardly* the crumbs which fall from the rich man's table. I have frequently seen a man completely discouraged by the refusal of his friends to help him to merely a suit of

clothes, or to secure a subordinate position. Rejected by his friends, disappointed in every effort to obtain an honest livelihood, he knows of one class of people who will share all with him, and in his desperation he goes back to his old companions. *Twenty-five per cent.* relapse in this manner.

Bodily suffering and chronic diseases. Many persons never enjoy perfect health. They suffer from a feeling of prostration. They are not robust and healthy. This may come from their parentage, or from subsequent illness. These people may have acquired the habit from some of the first causes I have enumerated. They have learned from experience that stimulants, for a short time at least seem to supply this want of nerve energy. It will bridge over, as it were, the feeling of prostration. The time comes, however, when this class of people desire to stop the use of alcoholics. They place themselves in an institution where, surrounded by temperance influences and supported by good diet and tonics, their reformation seems quite probable. An exposure, however, to causes which develop their physical weakness, produces in a number of cases a relapse. Men too, who are suffering from exhaustion and various painful diseases, have repeatedly told me that it was the cause of their relapse. A gentleman suffering from lupus of the face, of twenty years standing, assured me that it was the cause of his continued drinking. Patients who suffer from chronic lung disease frequently take alcoholics to quiet pain and relieve exhaustion.

At least fifteen per cent. fall from the causes just enumerated.

Night work, and the occupation known as "commercial traveling," cause many men to fall who had made every promise of success. Several years ago I made an estimate based on the admission of a thousand men into our institution who worked nights, and whose occupation deprived them of home influences and exposed them to an irregular and changeable method of living. *Fourteen per cent.* of the number I made the calculations upon, had relapsed from this cause. Recently I have carefully verified these figures, and find that almost without an exception the habit was formed before these men engaged in business, and this mode of life caused a *relapse*.

The absolute love for alcoholics, both as regards its taste and its pleasant effects when indulged in moderately, is a cause of a few relapses; but there is found in a majority of these cases some other facts, such as trouble, reverses, or evil companions. Certain customs, which are regarded by some of our most radical reformers as prolific causes of intemperance, I find exercise a very insignificant place among the reasons assigned for drinking at first, or as a cause of relapses. I allude to the prescribing of stimulants in combination with certain medicines by physicians; to the habit of offering wine to visitors on New Year's, and the partaking of wine at the communion-table. I have found two men who claim the first as the cause of relapse—one from taking wine on New Year's day, and have heard of those, but have never seen one, who dated his downfall from partaking of the sacrament.

I do not desire to have it understood that I favor the first custom, only when absolutely necessary, or that I advocate the second, somewhat ancient and fashionable habit of society, or commit myself as regards the propriety or impropriety of the use of ordinary wine in churches. My deductions are statistical. I can say this, however, that notwithstanding all that has been said and written against the use of alcohol as a medicine used properly and when needed to save life, there is no considerable number of physicians of any sect or school who feel that their entire duty is performed in the treatment of prostrating and septic diseases until the properties of alcohol as a stimulant and disinfectant have been tried. I was educated in a hospital where alcoholics were sparingly, almost beggarly, used, and I have stood by the bedside of the man with pneumonia and seen him die, whereas now I know, with ten years' observation, that a proper amount of this drug would, in all probability, have saved him. I have listened to the windy and stentorian arguments of the temperance lecturer and heard him declare that he would prefer—aye, a hundred times—prefer death to the prescribing of any alcoholics to him, even if on his death-bed. I have seen the same man and men on their sick-bed, not dangerously ill, but comparatively so, and long before there was any demand for it, have been told to exercise my own judgment in regard to the matter of stimulation.

In regard to communion wine being a cause of intemperance, I desire to say that particular stress and importance is paid to this by some at least who have no sympathy whatever with the church. If a single person has made the statement that he was tempted by partaking the elements commemorating the death and crucifixion of our Saviour, the statement has been exaggerated and frequently misrepresented by men guilty of profanity and licentiousness, and who never for a moment stop to consider how many hundreds have been saved by the influence of these organizations.

This may be somewhat foreign to my subject; but presently in this paper will come the question, "Who is to wage the fight against intemperance?" Is the attacking party to be made up of a few temperance societies, who are constantly berating the churches for fostering and aiding, and tempting men to become drunkards? Not by any means. Every temperance man and woman, whether they can subscribe to all the ultra ideas of the most stalwart, should be enlisted in the work, and the most ultra should receive them, and then, on a platform judiciously formed, wage a warfare, not in a way that invites disaster, but in a manner which will enlist the aid and support of the masses.

SHOULD IT BE TREATED AS A DISEASE?

A theory is being constantly urged, particularly by *Superintendents and Physicians of Inebriate Asylums*, that "*Drunkenness*" is a *disease*—not a *vice*. Their ideas and peculiar views find ready believers and advocates in the friends of the more aristocratic class of those addicted to the intemperate use of whiskey, and among the victims themselves who do not *care to attempt* reformation. I am not aware that anybody ever thought drunkenness in *a poor man a disease*—it is always a class that are able to pay large fees to specialists, and those able to board at asylums at $50 per week (more particularly in the East) and coddled with the idea that they have a peculiar pathological condition, that we find the largest number of advocates of this (to me) pernicious and destructive theory.

As early as 1872, I placed on record in an article published in the CHICAGO MEDICAL EXAMINER, certain observations in regard

to the newly discovered disease, inebriety. They were directly and explicitly opposed to the theory, and after nearly ten years' additional experience, during which more than 2,500 cases of alcoholism and 1,500 complications have been treated, my convictions remain unchanged. It is probably just for me to say, however, that a large number of physicians, particularly those engaged in the specialty of nervous diseases, believe alcoholism to be a disease.

I desire at this time to again affirm—

1st. That in my opinion there exists no physical cause which compels a man to drink intoxicating liquors.

2nd. That 99 out of every 100 men who have formed the habit *can* reform if they desire; the remaining one per cent. are probably insane and should not be held accountable. The trouble is, men will not use the means for reformation which are freely and entirely at their command. They desire to reform, they say, and yet insist in indulging in all other previous bad habits and associations. They say they desire to reform but refuse any cultivation of the moral sense, any strengthening of the will. They desire a reformation which costs but little or no effort—a *cure* which will enable them to practice all previous bad habits, mingle with all previous vicious associates, gratify all the lower feelings and passions, and to all of which I might add, use alcoholics with moderation, with no danger of ever becoming intoxicated. This is the kind of cure many desire. They do not want reformation.

I am constantly having gentlemen under my observation, formerly addicted to the use of alcohol, men of great business capacity, men of fine moral sense, and with wills powerful enough to carry them directly in the way of duty, notwithstanding any reverses, disappointments or temptations, and yet they believe in the so-called disease inebriety, and that they are victims of the malady. With these splendid business qualifications, with keen moral and religious senses, and with will powers equal to any emergencies, they clamor for some *specific medication*, which will do away with the appetite, which will enable them to take a single drink without the desire to take another. A man is reformed when his moral sense teaches him that it is wrong, and his will power is sufficiently strong to enable him to abstain from

taking the first drink, and for such a person to assert that he is the victim of a disease is to me nonsense. It should be remembered that we are now speaking of men who have acquired the taste for stimulants, and have a desire for them. We speak of the desire or motive for taking them as the disease, not the condition they are in after the stimulant has been taken into the system.

Dr. Parrish, in the Third Annual Report of the American Association for the Cure of Inebriates, speaking of consumption and alcoholism says: "The cough, hectic flush, night sweats and wasting of tissue are no more symptoms of disease in the one case than the injected and glaring eye, flushed face, confused speech and staggering gait in the other."

To me there is no comparison whatever between the two cases. Place these two patients in a room; supply the consumptive with a good generous diet and what medicine is necessary; supply the patient with the so-called alcoholic disease with a little nerve sedative, some beef tea, etc; visit them at the end of four days, and mark the progress of their respective diseases. The consumptive has continued to fail; his emaciation is greater; his strength is not so good; he is worse. How is it with the other? His injected and glaring eye has disappeared; his face is no longer flushed; his speech is intelligible; his gait steady. In a few days he is ready for business. He will now stop drinking if he earnestly desires. In order to accomplish this, however, he must do what every man must do who is peculiarly tempted by appetite or passion—carefully avoid the temptation, and in every possible way earnestly and zealously perfect a noble manhood, and reformation will certainly crown the effort.

Alcoholics produce very grave changes in almost every tissue of the body, and as I have said, and shall say again, produce disease of every variety. But it is the motive, or impulse, or desire that is called the disease. If a person is not responsible for an evil motive, or impulse, or desire, then we should not hold him responsible for all the calamities which come from partaking of alcohol. A man is not responsible for acts which absolute structural changes in his body compel him to do. I grant this of course; no one pretends that a man is to blame for the palpitation of a diseased heart induced by a rheumatism, or for an en-

larged spleen caused by chronic malarial poisoning. It is beyond the power of the will to prevent these maladies; they are of the body; they are diseases; we cannot avoid them; they have a previous history and a regular course. There is a cause for the structural changes which really exist.

And now about Inebriety: Is there any previous history? Any cause except the voluntary taking into the system a certain amount of liquor? Has any structural change taken place in the persons of the hundreds when the first drink is taken? Is there any inherent propelling cause why our pastors or our deacons should go out and take enough liquor to render them absolutely unconscious; and yet pastors and deacons, and doctors do and can, become completely under the influence of some alcoholic in one short hour. Shall we excuse them, and say they are not responsible and call it a disease? If this is a disease how easy the cure compared with all other forms of sickness? Take a man who has drunk continually for ten years; all at once he stops and never drinks again. We know them by the dozens. What has done it? What has cured the man of this "disease?"—this malady which has beggared his family for years and ostracised him from society? Is it any drug? Is it any change in some organ, where structural lesions had existed? Not at all. *He simply made up his mind not to drink.* Henceforth everything progresses well; the man is in perfect health; his business is excellent—never better; his family is happy; he conducts large and profitable enterprises; his mind was never as clear—his reasoning powers never so acute. This man, then, has been cured of his so-called desire without any medication, *by a simple process of his will*, and he remains so to the end of life. No other disease, the history of which I am acquainted, is cured like this. Some may urge, however, that this is an exceptional case; that it is a recent case; that the appetite had not obtained control of the man. To this I say, that a close analysis of more than 2,500 cases convince me—that a man who has drank ten, twenty or thirty years stops just as easy as one who has been addicted to alcoholic excess for a single month.

At this stage in the discussion I shall be met with the assertion, that since I maintain that it is not a disease, and inasmuch

as I say that it is all nonsense to talk about the irresponsibility of men in regard to drinking liquor, some will begin to talk about the sins of the fathers being visited upon the children, even to the third and fourth generation—and the anxious and kind-hearted relative and parent commences to excuse the drunkard on account of inheritance. They refer you to the scheme inaugurated by Laban for changing the color of his cattle, sheep and goats, and ask if you deny the fact that paternal impressions aud peculiarities are not at the present day transmitted to offspring.

I do not propose to discuss the matter of heredity. It is a topic itself, the consideration of which would consume more space than I have at my command, but I do desire to state a few facts. Of 541 men admitted to the Washingtonian Home during 1880, only eight (8) dared to say that they thought the appetite which they persist in appeasing was the result of hereditary influence: and of 1,525 admitted during the past four years, *only thirty-one* claim any influence of this kind. One other fact I desire to state and then I pass to another point. This is a matter of experience; a matter of observation. A man is reared in a moral or religious family, where liquor is never seen, and where the influence of heredity can by no possible way exercise any influence, but where indulgence and lack of early discipline is prevalent, and a general easy and indolent time is permitted. Let such a young man acquire the habit of drinking, and his reformation is more difficult than that of a young man coming up in a family where liquor is freely used, but very early he is taught to care for himself, to work, to obey those in authority, and to assume some of the responsibilities of life. That is to say, idleness and want of government are more important factors as causes of drunkenness than heredity.

I regard the testimony of the Bible of considerable importance on this subject. Diseases of various kinds are described to some extent, and vice and wickedness pretty sharply denounced. At no place, as far as I am aware, is a "woe" pronounced on a disease, or its victims precluded from the enjoyment of Paradise. Not so, however, with whisky drinking. The word of God, particularly the New Testament, speaks out in no uncertain manner in regard to the viciousness and sinfulness of drunkenness:

I. "A *woe* on drunkard-makers:" Hab. ii, 15.

II. "A *woe* on the wine-drinker:" Isaiah xxviii, 1, et seq. Prov. xxiii, 29, 30.

III. Drunkenness condemned as other sins: Luke xxi, 34; Rom. xiii, 13, 14.

IV. Drunkenness excludes from Heaven: Gal. v, 19, 20, 21: 1 Cor. vi, 9, 10.

THE TREATMENT OF INEBRIATES.

Having now discovered the first causes of inebriety, and found that a want of education among the youth of our country is the primal element which produces a habit which, in after years, is thrown off with the greatest difficulty; that the habit is formed so insiduously that those mostly concerned are hardly aware of its power before the victim is within its grasp, and *secondly:* having demonstrated by actual observation and by statistics, that after the habit is formed it is nearly impossible for men to entirely overcome the appetite—either from the fact that they cannot be aroused to the importance of accepting all the safeguards which are accessible to all, or because from defects in their early discipline they yield to drink as a panacea for all trouble, and finally, experience having convinced nearly every one having much to do with this unfortunate class, that many do not seem to care for any reform; do not care to stop a habit which not only brings sorrow and degradation to the household, but burdens on the State—what then shall be the treatment?

It seems to me that our labors should be fairly systematized among three classes:

1st. Among the young, who know nothing of the habit.

2d. Among those who seem honestly to reform, and are willing to accept the means which will produce it.

3d. Among the uncontrollable, incorrigible class, who profess to desire a reformation, but, after short periods of abstinence, repeatedly fall, and have not only ruined themselves but have discouraged and rendered miserable their relatives and acquaintances. This class is really a burden to the community.

As a result of my investigations, I am particularly impressed with the idea that the largest amount of temperance

work should be among the young; that by every means possible they should be prevented from forming the habit of *moderate drinking;* that the law against selling liquor to minors should be *rigid and enforced.*

The youth of our country, of all nationalities, should be made to feel that the cultivation of the taste for liquor is a dangerous habit; that alcohol in all its forms is a drug to be dreaded and avoided as strychnine or aconite. Let parents in all conditions of life be made to feel, and educated to believe, that it is a dangerous practice to allow, and a fearful responsibility to encourage their children to drink the mild wines, beer or cider.

While I am writing this section of my paper a gentleman fifty-two years of age, and one who has experienced all the degradation possible from drink; has lost his fortune; ruined his health, and became separated from his family, said to me: "Forty years ago I attended church three times each Sunday, and listened to sermons one hour in length each time, and in addition attended Sabbath school, and during all these religious exercises for years *I never heard a word in regard* to temperance. I commenced gradually and knew nothing of its dangers." This is true of hundreds and thousands. Such a scheme as I have mentioned is, I am happy to say, already being inaugurated and has been pushed forward by some church organizations with more than usual success: but it is not general enough; it reaches only a comparatively small number of those who should be benefited by such efforts.

What shall be done with the class who have already acquired the habit?

Probably about twenty per cent. can be reformed the first time their attention can be arrested long enough to keep them perfectly sober. This can be done by Homes, Asylums, Societies, Prayer Meetings, Ribbon Clubs, etc. Any way by which the whisky can be eliminated from the system, and a few days rest for the body be taken, and then followed by encouraging words; a definite plan of work, and a resolution never to associate with former companions. If the question is asked, Why have homes and asylums for inebriates been established and maintained at a cost of money and labor, if the habit of inebriation is not a disease,

and only twenty per cent. saved? I would reply, that after temperance organizations, and societies, and churches, and clubs have done all that is possible, some of the most promising of those reformed will relapse from causes which I have just enumerated.

These men need a place where they can acquire strength; where, separated from their companions, their *moral sense* can be cultivated and strengthened. Some men reform in a moment; with others it takes months, perhaps years. Many men use alcoholics for years without the impairment of any function of the body; others are injured in nearly every organ. For those who need considerable time to perfect a reformation, and that class, too, whose constitutions have been injured by the voluntary use of alcoholics, and who, from habit and association, have not the moral force to say No to an invitation to drink, to such, homes and asylums are houses of refuge. Reformation is a matter of development—not a "presto-change" affair—not done in the twinkling of an eye—but a matter of growth, a matter of development. A man who has been addicted to the inordinate use of whisky is never safe. He must be on his guard. A reformed man must be taught, and the lesson must be well learned, that let come what will—sickness, trouble, death, reverses—singly or all combined—that he cannot, with any safety, touch a drop, or he will fall.

Men who have stopped drinking, but are not guided by a high motive; those who have not made up their minds that for them it is wicked to use alcoholics because of an acquired taste, will constantly be making experiments. They see the great majority of men drinking a little every day, and they believe that they can do the same. They make up their minds to drink only beer after supper, or mineral water in the forenoon, some cinchona in the afternoon and beer in the evening. They proceed to experiment, and in about 999 cases in a thousand they fall. These men, then, are never safe; their burden is to fight an appetite which was formed before they knew its danger. Asylums for the reception of this second class should multiply, they must be increased, and the work in this generation will never cease. If it becomes less it will be due to the fact that the influence of innumerable temperance educators is being felt by the youth

of this country. Until this is done we must provide for the victim of intemperance.

What is to become of the remaining eighty per cent.? I stated, it must be remembered, that I thought about twenty in each hundred could be quickly reformed, if we could get access to them. What about the remaining 80?

Quite a number will reform after repeated trials and failures; a few, after education upon the subject, will drink less—are improved, but not reformed. But a considerable number go to form the third class, the description and treatment of which I will now speak.

These cannot be reformed, either through the influence of temperance organizations, or by the moral strength acquired in a reformative institution. These are the uncontrollable, incorrigible, disquieted men, who have not only discouraged but rendered miserable their relatives, and all their acquaintances. They have never learned to obey; they are undisciplined, and generally lack all feeling of responsibility. They are the men who beat their wives and starve their children; the men who steal the hard-earned money from their wives' purse, and the knives and napkins from their tables (as has happened within my own observation within the past two weeks) to buy rum, and, when perfectly sober, you expostulate with them, they will laugh, and assure you that they know their own business. The State should assume the guardianship of this class, and should put them in an institution whose management should be remarkable for its kind administration of affairs, and for a discipline most rigid. This institution should be situated on a farm, and men of this class sent there for not less than two years. From ten to twelve hours work every day during this time of commitment, combined with judicious and strict discipline, with the assurance that the State would again assume charge of them if they returned to their former habits, would produce an effect on these men, which would result in the reformation of nearly all. Let them learn that it is *some one's business* if they become absolutely indifferent to all of the responsibilities of life. In the language of Dr. Bucknill: "These men are not to be 'coddled' in luxurious indolence, nor impressed with the pernicious idea that they are interesting but helpless objects of social and psychological science."

ARTICLE IV.

THE PATHOLOGY OF INVOLUNTARY SPERMATIC FLUXES. A Paper read before the Eastern Kansas Medical Society. By GEO. H. PICARD, M.D., Topeka, Kan.

The subject I have chosen for this paper has by no means been exhaustively treated by American medical talent. Indeed, the prudent surgical *litterateur* chooses rather to pass it by, so malodorous has it become in the hands of charlatans and self-constituted "sexual pathologists." Excepting the admirable monograph of our distinguished countryman, Roberts Bartholow, and an English translation of Lallemand's "*Des pertes Seminales Involuntaires*," I know of no work in our language which is exclusively devoted to the subject, which now-a-days seems to be regarded by the surgeon with much the same distrust as the careful husbandman exhibits toward the well directed approaches of the fragrant quadruped scientifically known as *mephitis chiuga*.

For much the same reason, I opine, nothing is more evident than the fact that the general practitioner of medicine and surgery knows very little either of the pathology or treatment of spermatorrhœa; not, indeed, because there is any especial difficulty connected with the proper investigation of the subject—I mean in the learning of whatever is to be taught about it—but rather because the merit to be gained in this direction is so inconsiderable that most men prefer to labor in a field less approximate to quackery and more certain of repute.

As is often the case, the first difficulty in the discussion of spermatorrhœa is to be found in the definition. What is spermatorrhœa? Is it, as the term seems to imply, a constant stillicidium of semen from the external urethra? Or, does it embrace all discharges except those of a known specific origin, which may at any time escape from the urethral orifice? Is it a disease? Is it a symptom? Is ti a neurosis? Is it a local lesion? What is it? To say that it consists in a mere passive stillicidium of semen without the accompanying phenomena of

erection and ejaculation would include a collection of instances so rare as to almost do away with the necessity for a definition at all, and very likely exclude a far greater number of cases entirely pathological in character. On the other hand, it is not safe to affirm that every seminal-like discharge issuing from the urethra is actually seminal, for it is altogether likely that most of these fluxes do not contain spermatozoa, and are the result of irritation and hyper-secretion of the mucous surfaces of the canal.

At this point, lest it should appear that I am trying to shirk the responsibility of defining spermatorrhœa, I will give my notion of it, and although I am aware that it is by no means exact, I am persuaded that it includes nearly everything essential to a definition. *Spermatorrhœa embraces all involuntary spermatic fluxes occurring too frequently to be regarded as physiological.*

About fifty years ago M. Lallemand, the distinguished surgeon of Montpellier, expended much care and research in the investigation of the pathology of this disorder. So clever, so lucid, and withal so dogmatic were the results of this scholarly search as given to the world in the work, published in 1837, entitled "*Des Pertes Seminales Involuntaires*," that the author's views were almost universally adopted wherever surgery was known. Indeed, at the present time, most English and many continental surgeons cling fondly to the dicta of the surgeon of Montpellier, and I predict a revival of his doctrines in this enlightened country.

In order to make my observations clear, it will be necessary to preface them with a brief *résumé* of Lallemand's theory. The central idea in this surgeon's theory of the pathology of spermatorrhœa is the production, by various causes, of an irritation of the prostatic portion of the urethra and the seminal ducts. The following causes play an important *rôle* in the instigation of the disorder: Blenorrhagia and stricture of the urethra; gouty and rheumatic affections of those parts; sebaceous accumulations beneath the prepuce; venereal excesses and masturbation; excessive use of diuretics, cantharides, ergot, etc.; the abuse of alcoholic stimulants, and of tea and coffee; constipation ascarides, hæmorrhoids, etc.

M. Lallemand divides seminal losses into *diurnal* and *nocturnal*. Diurnal fluxes, according to the observer, are of vastly less frequent occurrence than those of a nocturnal character, although they are quite as serious, if, indeed, not more rebellious to treatment. They take place, for the most part, passively, without erection or ejaculation, during or just after defecation and micturition. It is not common to find patients suffering from both daily and nightly fluxes. The nocturnal losses are frequently connected with all the phenomena of sexual excitation, becoming pathological by reason of their involuntary nature and their abnormal frequency.

M. Lallemand found the results of genuine and well established spermatorrhœa to be speedily disastrous, the mischief being due to local injuries and important functional disturbances. "The penis becomes relaxed, the erections feeble; the *corpora cavernosa* either atrophy or their vessels lose tonicity, the *corpus spongiosum* and the *glans penis* also shrink; the testes undergo a certain degree of atrophy; the superficial veins of the penis become dilated and tortuous, etc. The subjective symptoms begin after a longer or shorter time to be marked: pains in the lumbar region; aching in the arms and testicles; the appetite is capricious, the digestion feeble; the bowels become deranged, constipation alternating with diarrhœa. The nervous system very often manifests sympathetic disturbance in the forms of vertigo, pains along the courses of the principal nerves, etc.

As the outcome of his microscopical research, M. Lallemand teaches as follows: "When the spermatorrhœa has assumed sufficient importance to influence the rest of the economy, the semen becomes more liquid and the spermatozoa are less developed and less vivacious, although their number may not appear to be diminished. When the erections begin to diminish, the semen is still more aqueous, the dimensions of the spermatozoa are sometimes one-fourth their normal size, their caudal prolongation being hardly distinguishable with a power of 300 diameters." In support of his theory of the local nature of spermatorrhœa, M. Lallemand brings to bear a far greater amount of cadaveric observation than any of his successors, be they

friends or foes, and in a supplemental treatise, published in 1839, he stoutly maintains the correctness of his early views.

Opposed to Lallemand and the Montpellier school are the great clinician Trousseau, in France, the neurologist Rosenthal, in Germany, and our not less distinguished countryman, Roberts Bartholow. Surgeons, as a rule, adhere to the teachings of M. Lallemand, thus resisting the encroachments of the all absorbing neurologists.

In giving a short account of the neuro-spermatists, as I propose, for the sake of convenience, to call all those who believe spermatorrhœa to be a actual neurosis, I shall avail myself of the fascinating monograph of Prof. Bartholow, which has lately reached its fourth edition, an event in medical literature in itself worth recording. "Spermatorrhœa," says Prof. Bartholow, not a whit less dogmatically than Lallemand, "is a neurosis. Although structural alterations may be coincident, they are not causative." That the disorder is a local lesion, Bartholow claims is unsupported by the evidence of morbid anatomy, and he does not hesitate to insinuate that Lallemand's cases were selected and his theory constructed to justify his practice. In support of his opinion, he first cites the authority of Mr. Thompson, who asserts that "sexual indulgence cannot have the effect of producing prostatitis, unless gonorrhœa be already existing." He further places in opposition to the views of M. Lallemand his own personal observations. It appears from his account, that he has lately made the dissection of a young man, dead of a double pneumonia, who was known to have practiced masturbation for many years, (whether or not this young man had spermatorrhœa he does not state). He informs us that he found no lesion beyond a catarrhal condition of the seminal and prostatic ducts and of the *vesiculæ seminales*. On this ground he declares the position of Lallemand untenable. He also maintains that the views of Lallemand in regard to the alterations in the spermatozoids are hardly less fanciful than his ideas on local structural alteration. In confirmation of this, he uses the experience of Liégeois, who out of six cases under observation, claims to have found only one case of azoospermia. Bartholow objects very positively to Lallemand's division of *diurnal* and *nocturnal*. He

regards the existence of passive diurnal emissions to be purely mythical, and explains that the passive discharges which sometimes occur during and after defecation and micturition, are not seminal in nature, being entirely destitute of spermatozoa. In this view he claims the support of Austin Flint* and many other original observers.

In spite of the literary and speculative fascination attached to these recent theories, I am, from a rational standpoint, a firm believer in the correctness of Lallemand's teachings. It seems to me that exact neurology is already sufficiently comprehensive without spermatorrhœa. It is beginning to appear that whatever the ambitious gynæcologist has not already included in his specialty is about to be appropriated by the equally enterprising neurologist. Thus is the once fair domain of the general practitioner being parcelled out among the specialists. That the pathology of spermatorrhœa consists in structural changes, manifested locally in the generative apparatus, appears rational to me for very many reasons.

Prof. Bartholow's charge against Lallemand's sincerity in the matter of the selection of his cases for cadaveric observations seems to me to be trivial and unworthy of Bartholow's great reputation. Lallemand did not base his opinion on a single observation, as Bartholow seems to have done; on the contrary, he deducted his theory of structural change from numerous carefully conducted observatious extending through a period of over fifteen years. It is also a significant fact that subsequent observers have confirmed M. Lallemand's assertions, *e. g.*, M. Raige. De Lorme, in his "Dictionary of Medicine," states that "in cases of spermatorrhœa, diverse alterations of the genital organs have been found," and, indeed, the fact has never been disputed until Prof. Bartholow *did not* find structural alteration *in his one case;* and it cannot but be evident that for the value of the evidence it would have been better to have stated whether or no the man had spermatorrhœa.

Prof. Bartholow has no faith in the phenomena of passive

* What Flint really says is this: "In the most of these cases the fluid is either the *liquor prostaticus* or a secretion from the *vesiculæ seminales*. The microscope affords the only means of determining that the fluid is seminal."

diurnal spermatorrhœa. He considers the fluxes which occur during and after micturition and defecation to be mostly of a mucous character, and less frequently the pathological relief of certain surcharged and plethoric individuals whose secretory functions are greater than their retentive capacities. In support of this belief, he quotes Dr. Chambers, of St. Mary's Hospital, who states that this discharge "has no more pathological significance than the leucorrhœa of women,"—whatever that may mean. To assert that the leucorrhœa of women is devoid of significance is to fly in the face of modern gynæcology. With a somewhat limited experience—I have a record of five cases of this kind—I am prepared to substantiate the correctness of M. Lallemand's views on this point. It may not prove wholly uninteresting if I relate the history of a case, which, at the time, I regarded as especially illustrative of the matter in question: An American of robust appearance, aged thirty-three years; married seven years; father of one child five years of age; by his own confession, inordinately addicted to venery. About three years ago, he first became conscious that a passive urethral flux followed defecation at intervals of three or four days; suffered no diminution of his sexual appetite for two years, but thinks that for the past year his desires are less importunate; no falling off in weight; no symptoms of nervous disorder; no nocturnal emissions; has experimented as to the effects of living *absque marito*, and finds that the passive fluxes continue and that they are not superseded by nocturnal ones. I have repeatedly examined these fluxes with the microscope and have always found them to be seminal. At this point I may remark, that I have more than once had my faith shaken in regard to the soundness of Prof. Bartholow's microscopic efforts. He confesses that even in known cases of spermatorrhœa which had existed for years, he has never found any change in the number or configuration of the spermatozoa. For my part, I can very decidedly affirm that I have seldom found the spermatozoids unaltered, the most noticeable change being a shortening of the caudal filament. I have not observed that there is a marked diminution in numbers; but that there is a positive decrease of motion, and that the caudal prolongations of the spermatozoids are very considerably reduced,

is clearly apparent with a microscope of only 300 diameters. I have repeatedly verified this fact and am quite satisfied that it will stand the test of criticism. It cannot be denied that there is a very close connection between the local phenomena of spermatorrhœa and a series of neurotic symptoms which in a large number of cases are likely to supervene. It is equally true that all other local lesions may be accompanied by the self-same nervous disturbances, always bearing in mind the fact, that lesions of the reproductive system—for reasons which are obvious—are less heroically borne than injuries in any other part of the human anatomy. No one can have failed to observe that all chronic disorders are often productive of melancholia and extreme nervous prostration. I have seen as great mental depression arising from the existence of an incurable ulcer on the leg as could be possible even in the most advanced stages of spermatorrhœa. The whole structure of modern gynæcology rests upon the neurotic sequences induced by primary uterine lesions.

It seems to me that the theory of the exclusively neurotic character of spermatorrhœa proves too much. That the nervous system exercises a peculiar influence over the glandular apparatus is undoubtedly true. Is any neurosis causative of prostatorrhœa or blenorrhagia? Review for a moment the morbid anatomy of spermatorrhœa (according to the Montpellier school, which I prefer by reason of its greater accuracy): There are ulcerations of the orifices of the ejaculatory ducts; injection and ulceration of various portions of these canals; similar alterations in the *vesiculæ seminales;* purulent deposits in the vesicles, in the *vasa efferentia*, in the epidermis, in the body of Highmore, and in the testicle. Now, in prostatorrhœa there is precisely an analogous condition of the ducts; yet, as far as I know, no neurologist has proclaimed the sovereignty of the spinal cord over this disorder. Is not the abnormal increase of function in one series of glandular apparatus as easily to be accounted for as in another?

Bartholow teaches that genuine spermatorrhœa is exceedingly rare, and that most cases that present themselves for treatment are purely imaginary. I believe this to be fortunately true, but does it not somewhat militate against the neurotic theory? If

spermatorrhœa be purely nervous in its origin, would it not, in view of the enormous existing causative influences, be an every day matter? In these degenerate days of shattered nerve forces, habitual excesses and social corruption, one might indeed shudder at the unwholesome possibilities suggested by the neurotic idea! I grant that this theory is excellently well adapted to imaginary spermatorrhœa, but for the pathology of true spermatorrhœa I prefer something more rational.

But the most telling testimony against the theory of Trousseau and Bartholow may be found in its therapeutical sequel. I am not unwilling to admit that anaphrodisiacs may be useful in a placeboic sense, and that nerve-stimulants—so called—may serve to buoy up the despairing fortunes of the hesitating sexual neophyte; but I do not believe that a case of real spermatorrhœa has ever been cured by any one or by all of them. Clinical medicine must have shown this to be true.

A fact worthy to be noticed is, that in spite of the strictly neurotic ideas enjoined by both Trousseau and Bartholow, they rely very greatly upon local and mechanical treatment. M. Trousseau has even achieved his most satisfactory results from the employment of local empiricism, such as the forcible dilatation of the *sphincter ani*, and the insertion of a boxwood block into the rectum. Bartholow does not hesitate to avow his lack of confidence in nerve-stimulation and brain-food; he seems to find his most reliable agent in hydropathy, applied in the form of the continuous cold current. I have not observed that he explains the therapeutics of the continuous aqueous current in any original or strikingly neuropathic manner.

If an account of the rational treatment of spermatorrhœa were demanded of me, I should say: Be certain of the diagnosis,—it is a somewhat rare disorder, and all passive fluxes from the urethra should be doubtful until the microscope has told the story; treat nervous complications as intelligently as you would those arising from any other cause; and use some approved form of local treatment. I agree with Bartholow, that the *porte-caustique* of Lallemand is a somewhat dangerous agent in unskillful hands, but it is very efficient in the hands of the

surgeon who knows the parts and the instrument. The tannoglycerine is about as desirable as the caustic and has the merit of being harmless. I have injected a dram or more of the tannoglycerine—℥-℥—at intervals of a week or so until a cure was effected. These injections may be made in various ways. The universal syringe can be attached by means of the screw to a silver catheter, which can be introduced into the prostatic urethra. There are hard-rubber syringes especially constructed with long, curved, bulb-tipped nozzles, which answer the purpose most admirably. Various other astringent injections are of great service, the only requisite on the part of the surgeon being ordinary skill and attention.

ARTICLE V.

OUR CALLING. An Anniversary Address, delivered before the Seneca County (Ohio) Medical Society, August, 1880. By F. WM. SCHWAN, M.D., Poplar, O.

All human knowledge, save that which was strictly essential to the physical wants of man, has had a very obscure and primitive origin; and in every department of science, literature and art, we observe the same varying struggle for existence and progressive development. The conditions and relations of men have called forth the various kinds of knowledge that has sprung up, flourished and decayed, as their several wants have been supplied, or the necessity for them subsided.

Primitive man possessed but few attributes and wants, and these were only such as addressed themselves more especially to their physical understanding, prominent among which was no doubt the avoidance of bodily pain, and a dread of death. But as society advanced these conditions were more fully recognized and appreciated, and methods devised for relief. What these methods were will ever remain an impenetrable mystery, but tradition undeniably points out that pre-historic man possessed some crude means to alleviate suffering.

Passing from conjecture to proof, we find it asserted in the

immortal Iliad, that at the siege of Troy, 1,100 years before the Christian era, the healing art had made considerable progress. Of course no corps of skilled surgeons then existed, but individual personages were frequently called upon to minister to the suffering, Agamemnon was called from the ranks of the besieging host to suck the poisoned wounds of Meneleos and Philoktel, and apply soothing salves. Achilles appears to have been especially qualified in the healing art, which he acquired from the Centaur Chiron. Patrokles had also become celebrated as a physician, and when Eurypelos was struck by an arrow, he removed the missile and dressed the wound with a soothing and healing herb, the virtues of which he had learned from Achilles, and which botany informs us to have been the *Achillea Millefolium*, or Yarrow.

Among some of the nations of antiquity it was customary to delegate persons who claimed to possess especial knowledge of the healing art to minister to the wants of the afflicted, and in Asia, Egypt, Assyria and Greece it was the practice to place the invalids on the street corners of the cities, with a placard fastened to them describing their symptoms and asking advice from any passer-by who may have been similarly affected. In some countries the people firmly believed that any derangement of the vital functions was a wrathful visitation of some deity, and the natural manifestation of disease was regarded as an evidence of displeasure of the offended spirit; and this belief being so indelibly rooted among the superstitious populace it became an easy matter for mountebanks and frauds to announce possession of supernatural powers, and by the practice of mysterious incantations and jugglery inspire faith, and proclaim themselves especially ordained as mediators between the invalid and the deity. If, perchance, the poor sufferer failed to receive the desired relief, it was always attributed to the want of belief on the part of the invalid.

In India and Egypt, the most cultured peoples of antiquity, we find invalids making pilgrimages to the sacred temples of Osiris, Isis, and Serapis. Here, also, we find mediators clothed in sacred vestments interposing for the relief of the pilgrims, before some special deity that was thought to preside over some

particular part of the body, and, if some of our modern specialists could take a flight to ancient Memphis or Thebes they would be surprised to find how little they know of the manifold subdivisions into which the human form could be divided for treatment. From among the Brahmins of India, and Levites of Israel, sprang the lawgivers, physicians, priests and mediators; and it will be recollected that Moses, possessing not only the qualification of a lawgiver, but also that of a physician in an eminent degree, was enabled to give to his people a complete code of political ethics and laws of life, which being divested of their assumed sacredness, not only challenge our admiration but command our respect for their correctness. Solomon, also, gave to the Jews a system of "Laws of Health," and advised the priests to teach the treatment of disease by natural means, but those sacred officials resisted the innovation and had the tablets burned.

In Greece—the cradle of philosophy, of science, of literature and of art—the first grand forward stride in rational medicine was made, and in temples especially erected for the purpose, the god Asklepias and his daughters Hygeia and Pavakoia presided, and restored the invalids by teaching the observance of natural laws, based upon natural phenomena, and the application of practical hygiene in treatment.

The temples of Epidorus were also noted resorts for invalids, and were simply hygienic establishments from which the mysticism of antiquity had not been fully banished.

When Greece had arrived at the zenith of her glory; when Pericles directed her administration; when Herodotus enriched her literature with the splendor of his genius and Phidias inspired her art with the grandeur of his conceptions, when Plato and Socrates electrified mankind with the brilliancy of their attainments in metaphysics, medicine was yet a very little, sickly, weakly babe. But a nation that could bring forth such intellectual giants could not long remain in mental bondage, and gradually, almost imperceptibly, did the gods and goddesses lose their prestige, and, in the time of Aristophanes, we already find a numerous sect, known as Alklepias, who made a practice of observing disease and prescribing remedies; they also transferred the healing art from the sacredness of the temple to the private

dwelling, and divested it of the mystery and jugglery that had characterized it from the beginning of the world. About this time was also established the noted gymnasii, in which were taught the observance of the laws of nature as well as the attainment of the highest physical development. Philosophy, also, was a mighty factor in shaping and moulding the minds of men, and when the great father of medicine, Hippocrates, came upon the stage of action, the world was not unprepared to welcome him. The attainments of this extraordinary man border on the marvelous, and his success was so great that his services were called into requisition not only in his own province but also in Macedonia, Thrace, Athens, Thessaly and Asia Minor. He accomplished a remarkable cure on the Macedonian king, Perdikkos, and restored to health Demokritos, of Abdera, for which he was offered ten talents of gold (nearly $12,000), but refused the compensation, claiming that the acquaintance of the renowned philosopher and savan richly compensated him. He was also called by Artaxerxes to Persia, which call he refused. With the advent of Hippocrates the calling of the physician assumed character, and the practice of medicine became a distinct branch of knowledge. But Greece had well nigh fulfilled her destiny in the category of nations, and her glory began to decline, and with it were scattered all her brilliant achievements —some to be lost forever, while others were rehabilitated in other lands. From Greece the new art was transferred mainly to Egypt, where the great Ptolemys exercised a patronizing care, and for 300 years new discoveries were constantly being added.

With the decline of Hellenic grandeur Rome became a resort for many of the followers of Hippocrates, but the ignorant populace received them with suspicion and ridicule, and finally drove them entirely out of the country. From this time on until the advent of Julius Cæsar, Rome contented herself with her soothsayers, her jugglers and her sybillic writers, and all there was of the healing art was in the hands of an ignorant and superstitious priestcraft, who created a special deity for every disease, prominent among which were the goddesses Febris and Cloacina, also a famous one named Scabies, from which we conclude that the holy fathers were familiar with the itch. Cæsar

became a patron of medicine and gave it every encouragement, and by the efforts of Claudius Galenus it received a mighty impulse which extended to the fall of that vast empire; but with its disruption the art was again jeopardized,—only a faint spark remaining which floated over, and was fanned into life in the mystic land of the followers of the Koran. From Arabia it found its way into Africa, and from thence across the Mediterranean to Spain, where for a long time it made little progress. In Central Europe, now the center of medical science, no art, no science, no culture, found congenial recognition. The refinement of Hellas, of Alexandria, of Rome, was supplanted by the migrations and devastations of the Goths, the Vandals, the Franks and the Lombards. Brute force swayed the destiny of Europe, and for 600 years every possible obstacle was thrown in the way of rational medicine. What little there was of the healing was completely under ecclesiastical influence, and, at the time of Innocent III, in the twelfth century, no physician was allowed to visit a patient without first going to confessional. But an art so intimately associated with the happiness and welfare of humanity cannot always lie dormant even amidst the grossest ignorance and superstition, and with the establishment of the school of Salerus the physician again rose into prominence, and the teachings of Hippocrates, after many vicissitudes, received a new impulse, gathering forece and power, continually, down to our own time, resisting all antagonisms and adverse circumstances, triumphing over all opposition, and standing to-day, an enduring monument of humanity's highest, noblest and best impulses and sympathies.

ARTICLE VI.

CREMATION. By Dr. C. W. PURDY, of Chicago. (Concluded from page 200, Aug. No., 1881.)

In 1850, a Report on a General Scheme for Extra-mural Sepulture was presented to both houses of Parliament, by Carlisle, Ashley, Chadwick and Smith. The report contains an account of a large number of London church-yards, showing their bad condition

and the remarkable prevalence and virulence of cholera in their vicinity. Dr. Sutherland testified "that he had witnessed several outbreaks of cholera in the vicinity of grave-yards, which left no doubt on his mind as to the connection between the disease and such local influences; and that it is only when some epidemic comes that the consequence of long antecedent neglect becomes so apparent as to direct attention and excite alarm."

Burial grounds are unquestionably ruinous to health, as both theory and facts amply demonstrate; many sections of population suffer annually diseases and death, which are exposed to their influences; all engaged in this unwholesome system suffer—the grave-diggers, the gardeners, the men who repair the vaults and tomb-stones, the friends who visit the graves, and the whole funeral procession are exposed directly. There is no redeeming feature about this burial system, degrading to the dead and dangerous to the living.

Under the general adoption of cremation of our dead all this would be changed. The body would be quickly, cheaply and harmlessly rendered back to atmosphere and earth; to the former, carbonic acid and watery vapor; to the latter, ammonia and earth salts;—nothing is left corrupt, but rapidly cleansed and purified. Instead of the damp, cold shroud of a decaying grave, shared by worms and reptiles the most loathsome, the atmosphere of light would enshroud the etherialized remains in the brightness and purity of living day.

There is one feature of the burial system which we have but time to notice briefly in passing,—the most shocking to our feelings and dreadful to the imagination. We refer to the awful possibilities of living burial. This has happened, and it will happen. Hardly a grave-yard is opened but coffins are found containing bodies not only turned, but skeletons contorted in the last, hopeless struggle for life underground.

The *London Times*, May, 1874, says: "In August of 1873, a young lady died soon after her marriage. Owing to the intense heat she was buried the same day. Within a year her husband married again, and the mother of his first bride resolved to move her daughter's body to her native town. They open the vault, and find the poor girl's body fallen prostrate, her hair dishevelled,

her shroud torn in pieces. She had risen, and burst her narrow prison to find herself in one a little larger, but far more inexorable. How long did she cry piteously for help? How long did she struggle and pray? We cannot tell: we can but guess her agonies!"

Much might be written on the subject of contamination of springs in the neighborhood of grave-yards, and there is no limit to the poisoning of such waters. One author states that there is not a pure stream of water throughout the whole of England. Is it any wonder then that that country is such a hot-bed of typhoid fever.

A fearful epidemic decimated the villages of Rotondella and Bollita, which was clearly traced to the water which had been drained into the wells through the neighboring hill-cemetery. Hundreds of wells have been found tainted so badly from the same cause as to necessitate their disuse. At Paris, M. Duchamp discovered a spring that filtered entirely through cemeteries and tasted strongly.

Dr. Pappenheim declares that springs tainted with organic matter of grave-yards are often found at great distances from their sources of pollution. But there is no necessity of multiplying instances of a fact that has come under the notice of the most of us.

Let us turn from the dark and gloomy picture of inhumation, whose perpetuated shadows darken the hours of so many happy homes, to the brighter, because purer, more beautiful, because more human, system of cremation.

Of late years a tide of opinion seems to be setting in in favor of the old custom. For the last ten years many distinguished physicians and chemists of Italy have warmly advocated the general adoption of cremation. In 1874, a congress was called to consider the matter at Milan, and petitioned the Chamber of Deputies for a clause in the sanitary code, permitting cremation under supervision of the syndices of the code, which was granted, and the result has been so far successful, that about seventy bodies were cremated in Milan in 1880.

In Switzerland, Dr. Ercolani is the champion of the cause, and there are several associations for its support. So long ago as

1797, cremation was seriously discussed by the French Assembly, and the events of the Franco-Prussian war have again brought the subject under notice of the medical press. Vienna has made cremation permissible, and cremation is practiced in the Austrian Capital. Dresden, Leipsic and Berlin are the centers of the German movement, which is quite as progressive in the matter as Italy.

In England, Dr. Lord, for many years medical health officer for Hampstead, continued to urge the practical necessity for the introduction of the system. Sir Henry Thompson, however, first brought the question prominently before the public, and started in 1874 the Cremation Society of London, the objects of which were stated to be to introduce through the agency of cemetery companies, municipal authorities and burial boards, some rapid process of disposing of the dead, which could not offend the living and should render the remains innocuous."

Thompson used one of Siemen's furnaces, consisting of—

1. A generator, in which the coal or wood generating the gas mixed in certain proportion with the air.

2. A regenerator or square chamber, intersected with perforated brick walls, which receives the gases at a high temperature.

3. A calefactor or actual combustion room; this chamber is flooded with a gas and air at a temperature of 2000° F. It contains a cylindrical vessel about seven feet long, by five feet six inches in diameter; into that vessel is deposited the body, the whole at a white heat.

The gases of combustion rush off but are not allowed to taint the atmosphere; they are caught and carried over irregularly disposed layers of heated bricks till oxidation is complete. Not a particle of smoke at length arises from the chimney, and nothing but a little harmless gas reaches the outer air; throughout nothing repulsive is smelt or seen.

Prof. Gorini estimates the cost of cremating an ordinary body at from $10 to $15. The expense attendant on reducing a body in the furnace of Dr. Le Moyne, at Washington, Pa., is $15. The actual cost of incineration in the Siemens regenerating furnace is only 75 cents. These estimates are for single bodies, which would become very much reduced by the general adoption of the system, as will appear obvious.

The first body that was cremated in the United States, according to Dr. Le Moyne, was Colonel Henry Laurens, a member of the military family of General Washington. His body was cremated in South Carolina, in 1796. The second was that of Henry Barry, who lived and was cremated in the vicinity of Marion, South Carolina. The third was the body of Baron de Palm, cremated in the furnace erected by Dr. F. J. Le Moyne, in Washington, Pa., December, 1876. The fourth was that of Dr. Winslow, of California, cremated in Salt Lake City, in a temporary furnace erected through his request by the administrators of his estate. The fifth was the child of Julius Kircher, in his furnace in New York City, in the autumn of 1877.

During the first two years after the erection of the Washington Crematory nearly a hundred applications were made for cremation, which were declined, for the reason, as Dr. Le Moyne says, "that it was not constructed to be operated as a business, and an occasional cremation only was permitted for the purpose of keeping the subject before the public eye." I am informed however, by Mr. J. V. Le Moyne, that, since his father's death, the executors of the estate have thrown open the crematory for the use of those who desired to be cremated at the cost of incineration, and accordingly some sixteen bodies have been cremated in the Washington Crematory during the past year.

The process of disposing of the dead by cremation, as proposed and recently advocated, is not destruction by fire, or burning in the sense that many suppose. The body is reduced to ashes by the chemical action of intense heat, at a temperature of 2,000 to 3,000 degrees, without contact with flame or fire.

As an illustration we quote from one of the daily papers, observations taken at the cremation of the wife of a German physician in Dresden, November 6, 1874: "The hall around the furnace was decorated with flowers, and in every other respect the solemnity which should attend so serious a site was duly observed. The process of cremation was screened from the eyes of the lady's friends by an iron door. There was no smoke nor any unsightly transformation of the body. When the coffin was consumed, the body appeared in its natural state, then red-hot, and

at last appeared to be of translucent white. From this it crumbled into ashes. Up to the period of its entire consumption, the process was merely a rapid drying up."

In the ordinary Siemen's Regenerating Furnace (used by Reclam in Germany, and Thompson in England), only hot blast is used, the body supplying the hydrogen and carbon, or a stream of heated hydro-carbon, mixed with heated air, is sent from a gasometer supplied with coal or wood, the chamber being heated to a high degree before cremation begins. The advantages of this furnace are, that the heat of the expended fire is nearly all retained by the regenerator, and the gas retort admits of production being stopped without much loss. The noxious gases which are produced during the first five minutes or so of combustion, pass through a flue into a second furnace and are entirely consumed. Bodies may be reduced in this furnace in an hour or less to from three to six pounds of pure white ash, or lime dust. Thompson reduced a body weighing 144 pounds in fifty minutes to about four pounds of ash.

Hawes describes the cremation ceremony, as proposed, in the following language: "The body is conveyed to the crematory and has been placed in its shroud, or, if you will, even in the coffin, at the mouth of what seems to be a small cave at the entrance of a Gothic edifice; the door is closed, and whilst the mourners enter the funeral chapel to hear the service read, the body glides into the crematory by the simplest machinery, and is returned in the words of your burial service: "Dust to dust, ASHES to ASHES," words culled from the old Greek or Roman cremation ritual, misapplied for centuries to Christian burial." No slowly putrefying form remains in the damp, cold ground, with its dreaded memories to haunt the imagination and sting the sensibilities of the living.

Cremation seeks not, as many suppose, to divorce the revered memories or tender affections from the honored dead; but rather it would rob the last resting-place of "the small cold worm that fretteth the enshrouded form." It would separate from the dead only those memories which fill the breast with horror, and feed the imagination with dreadful forebodings of the corruptible before it "put on incorruptible."

Plant still if you will in the sublimated ashes of the departed, the myrtle and the ivy, the primrose and the laurel, whose budding foliage shall cluster about the golden urn and form a perfumed veil of beauty, at once an emblem of the purified remains and a beautiful allegory of the hereafter.

It has been argued against cremation that it interferes with the doctrine of the Resurrection. If this were true, what becomes of the army of martyrs who have perished by fire, and many thousands of good and worthy people who have been burned in conflagration? Did not David thank the people of Jabesh-Gilead for burning Jonathan; nay, did not God himself command Abraham to offer up his son Isaac on the altar, and though he stayed his hand, requiring not the sacrifice, yet the funeral pile and its contingencies were fully authorized by God himself.

But granted even the old doctrine of a literal resurrection, and cremation does not affect it, for a power capable of restoring and refashioning atoms dispersed through the metamorphosis of centuries, would be equally capable of restoring the atoms dispersed by fire in a brief hour.

A more reasonable objection has been urged by opponents of cremation, on the grounds of depriving the courts of means which often convict criminals in poisoning cases. The many great advantages of adopting cremation as a general practice are so weighty as vastly to counterbalance these. Indeed, we have not in man's history any great benefit resulting from a system or practice, but it is attended by its consequent minor evils; no great public good but has its attendant draw-backs. Who, for instance, would prohibit public festivals and holidays, because theft, debt and drunkenness are increased thereby? Who would stop the sale of weapons to prevent suicides; yet the advantages claimed for cremation have greater demands on public policy and safety than most of these.

Not the least objection to the present system of inhumation is its enormous attendant expense, a tax so great on the resources of many poor families, that it actually amounts to oppression. The savings of months or years, which perhaps was the only reliance against temporary reverses or actual want; and perhaps might have kept starvation from the door, is swept away by the

almost absolute necessity of keeping up the appearances of what are termed a decent Christian burial. We have no hesitation in saying that the vast sums of money spent on funerals would keep every needy family in the land from hunger and want. The practice of general cremation would dispose of the dead more in keeping with the laws of nature; more safely to the dead and to the living; in short, more desirably in all respects at a cost less than one-fifteenth the sum now squandered to embellish the earth as a dead-house.

Figures are strong facts. It costs Chicago $1,000,000 annually for funerals alone, and it cost Illinois, in 1880, $6,000,000 for the same purpose, which is nearly one-third the amount of internal revenue yielded by the State for the same period. It costs the United States over $100,000,000 annually for funerals, and the saving which would result from generally adopting cremation would amount to a sum sufficient to pay off our national debt in about fifteen years; while our government has not been able, with the immense revenue yielded by this country, to reduce one-third of this debt in the same length of time. One and one-fourth times more money is spent annually on funerals in the United States than the government expends for public school purposes. Funerals cost two and a half times more money annually than would buy the grounds, buildings and apparatus of all the universities and colleges in this country. The amount of money expended on funerals in the United States, if saved for a fraction over four years, would equal the total sum disbursed by our government for pensions during the last twenty years.

Funerals cost this country in 1880 enough money to pay the liabilities of all the commercial failures in the United States in the same year, and give each bankrupt a capital of $8,630 to begin business again. Funerals cost annually more money than the value of the combined gold and silver yield of the United States in the year 1880. The population of the Christian world, in round numbers, is about 400,000,000 of people, or a little less than one-third the entire population of the earth. At the average cost of burying the dead in the United States the Christian world would spend annually for funerals $800,000,000 at a safe estimate. Let this annual expenditure of money be

saved, with its accrued interest at six per cent., for little over twenty years, and it would pay off the combined national debt of the world.

What a vast amount of want and misery the judicious expenditure of this money would save the human race! It would wipe out pauperism from civilization. Yet this does not by any means express the gigantic expense of the burial system, for, remember, we have only now spoken of funerals. Add yet to these the sums of money invested in the millions of acres of valuable property used for burial-grounds; the immense sums lavished in erecting costly monuments and embellishing graves; the depreciation in the value of residence property in the vicinity of these graveyards. Add these together, and we have a sum expended in maintaining these cities of the dead so stupendous, that it is well calculated to arrest the attention of those whose business it is to deal with questions of public policy.

And to what useful purpose to the dead, or the living, is this vast fund so recklessly—I would say, criminally—squandered? To the former, to preserve, against nature's laws, the putrid relics of organic man, in his most humiliating and degraded condition, long years after nature's laws would have transformed him into many varied and lovely forms of renewed organic life, surrounded by sunshine, and giving an air of life and beauty to the grandeur of nature's habitations.

To the living, the expenditure of this sum means creating and perpetuating diseases the most virulent and malignant; the choking of our atmosphere in many instances with gases the most dangerous to health and to life itself; the perpetuation of memories the most ghastly and revolting to sensitive natures; for such never fail to make themselves a part of that vaunted sentiment surrounding the Christian tomb. It means hunger, want and despair, oftener than the world cares to investigate, to many of the poor survivors, whose last savings have been swept away—aye, and heavy debts contracted in order to afford the deceased member of the impoverished family a "decent, Christian burial."

CONCLUSIONS.

I. That the present system of burial is attended with danger to the living.

II. That abuses of the system are frequent, and at all times difficult to prevent, and sometimes become so serious as to result in overwhelming whole communities with pestilence and death.

III. That a residence near crowded grave-yards predisposes to diseases characterized by evidences of slow poisoning.

IV. That the system of burial, as now practiced, is necessarily attended with enormous expense, which is an oppressive drain on the resources of the poor.

V. That the general adoption of cremation would dispose of the dead rapidly at a nominal expense, compared with inhumation, and with entire sanitary safety to the living.

VI. That a similar disposal of the decaying organic products of large cities would tend to diminish the whole class of zymotic diseases which at present is the cause of considerably more than one-fourth of our death-rate.

ARTICLE VII.

THE PATHOLOGY AND TREATMENT OF YELLOW FEVER; WITH SOME REMARKS UPON THE NATURE OF ITS CAUSE AND ITS PREVENTION. By H. D. Schmidt, M.D., New Orleans, La. (Continued from page 178, August No., 1881.)

REMARKS ON THE PROBABLE NATURE OF THE INFECTIOUS POISON OF YELLOW FEVER.

In the preceding part of this treatise, I first conducted the reader to the bed-side of the yellow fever patient, in order to take a general view of the clinical symptoms, such as they generally present themselves to the physician during an epidemic. After the study of these phenomena, I conducted him to the dead-house, and pathological laboratory, where I showed him the pathological changes in the organs and tissues which had taken place during the course of the disease; and lastly, attempted to draw a sketch of the complex of pathological processes constituting the disease, by comparing the clinical phenomena with the pathological facts revealed by the autopsy and microscopical examination, the whole representing the general pathology of yellow fever.

In discussing the latter, I frequently referred to the influence or effect of the infectious poison, the original cause of the disease, but forbore to make any remarks upon its particular nature, which I shall now discuss. While in the preceding pages, however, we dealt with substantial, incontestable facts, with phenomena or things of a tangible nature, directly appreciable to our special senses, we now approach a subject which, on the contrary, is, to a certain extent, hypothetical in its nature, and where, unfortunately, too much space is left for the vagaries of the imagination. With the exception of cholera, there exists no disease of which the original cause or contagion has given birth to such a variety of speculations, both among physicians and laymen, as yellow fever. Inorganic and organic nature, the earth, the water, the atmosphere, minute plants and animals, the planets, and even invisible germs, have been suspected to be the cause. And accordingly, especially during an epidemic, when the daily newspapers are pregnant with yellow fever literature, there is no want of suggestions, and wise speculations, relating to that mysterious agent, the "germ" of the disease. In such times, high or low, wise or ignorant, everybody has an opinion, a view of his own on the subject, and without regard to whether it is based upon sense or nonsense. How cheaply feels the man of science and facts, the lover of truth and reason, in such a time. His voice is too weak to be heard in the turmoil, and all he can do is to observe and to collect, and to study the facts relating to the subject, to be conscientiously compared with those already established by other observers, at a time when the storm has passed, and the general excitement is worn out.

These remarks will not only show the difficulty, but, moreover, the delicate nature of the subject which I now propose to discuss; and if I fail in this task, it will not be owing to a lack of desire of presenting the subject fairly and without prejudice, but to my incapacity.

In the discussion of a subject, such as the probable nature of the infectious poison of yellow fever, of which the opinions of physicians differ so widely from each other, it is essential that the author should present it to the reader in all its various aspects, and be concise and definite in the terms of his demon-

strations; while, on the part of the reader, in order to properly understand the arguments brought forward and to judge correctly, it is no less important that he should be familiar with the details of the subject. To comply with these propositions, it becomes necessary to introduce the subject with some general remarks.

As long as yellow fever has been known to the civilized world, a controversy has existed among medical men, especially among those of prominent seafaring nations, as to whether this disease is communicable from individual to individual, either in a direct or indirect manner, or whether its cause exists uniformly throughout the air of the infected district, having access to all persons alike. In other words, the question was, and still is—Whether yellow fever is a *contagious*, or a purely *infectious* disease.

As the terms "infection" and "contagion" have formerly been, and perhaps still are, by a number of physicians looked upon as synonymous, though they really convey different ideas, some explanation is demanded in what sense they will be used in this treatise. As far as I understand their proper meaning, the term "infection" signifies that the disease has been acquired by some noxious body taken into the blood from *without*, and without regard to whether the infectious poison is a product of the animal organism itself, or, on the contrary, a body *totally foreign* to it, which, whether *animate* or *inanimate*, owes its existence to external causes, whatever they may be. The term "contagion," on the other hand, implies that the *active poison emanated* from the diseased person or animal, and, if entering the blood of a healthy individual, gives rise to all the symptoms and organic changes by which the original disease is characterized.

Now, it is obvious that a purely *infectious* poison, as, for example, that causing miasmatic fever, hardly ever exists limited to one particular spot or center, but is rather distributed throughout the whole air of the infected district, and affects many persons at the same time; while a *contagious* poison, like that of small-pox, being *most probably* a product of the diseased organism itself, originally emanated from the affected person or animal, and extends its noxious influence by being inhaled or swallowed by other individuals in the vicinity. From this common center the disease spreads, either *directly* from individual to individual, or

indirectly by adhering to surrounding objects, such as clothes, bedding, furniture, goods, etc., upon which it may be carried to distant places, and, as in the first instance, propagate itself by entering the system of other individuals.

From this explanation it will be seen that some poisons may, in entering the organism, give rise to certain diseases not communicable from individual to individual, and be therefore purely *infectious;* while others, producing communicable diseases, and being *contagious*, are at the same time *infectious*, as they must necessarily enter the blood of the individual before they can exert their noxious influence upon the organism, and manifest their contagious nature. But notwithstanding this general trait of character, possessed alike by the *purely infectious* and *contagious infectious* poisons, the latter have a *special* trait besides, consisting in a certain permanency of the impression which they make upon the organism, and by which the latter acquires the so-called "*immunity*" from a second attack of the disease. Accordingly, a *purely* infectious disease may recur quite frequently, while the first attack of a *contagious* infectious disease protects the organism from another.

Although many causes have in the course of time been assigned to the origin of the various infectious diseases, nothing definite is as yet known about the intimate nature of their infectious poisons. The most prominent theories, at present entertained on the subject, are—the "gaseous," the "glandular," and the theory of the so-called "contagium vivum." The first refers the poison to gaseous or molecular substances, arising from the decomposition of vegetable and animal matters, or even from certain emanations from the ground of certain localities, known as *miasmatic* or *malarial* poisons. The second theory explains the poison as being of an animal origin, similar to the poison of snakes or other animals, or produced by certain morbid changes in the blood and tissues, called forth by its original introduction, and giving rise to morbid secretions possessing its specific properties. The theory of the "contagium vivum," lastly, refers the poison to certain minute organisms, which, entering the system through the lungs, alimentary canal, or even wounds, get into the blood, and give rise to the specific symptoms of the disease. Each of these theories, of course, exists in different minor forms or variations.

Now, as regards the cause of yellow fever, each of these theories, with its minor variations, has been put forward for its explanation, but without any palpable or positive proofs; for if anything regarding it can be proved, it is only negatively. With a considerable number of physicians, the theory of the contagium vivum, or so-called "germ or bacteria theory," being of a more recent date, has become especially popular. But as its origin and details are, as it appears, least understood of all others, I shall give it the preference for a full discussion, from which the reader may judge for himself whether it is applicable to yellow fever or not.

The theory of a "contagium vivum," relating to the cause of infectious diseases, is not of a recent date, but seems to have existed as a vague idea since the invention of the compound microscope, by means of which the existence of minute organisms first became known to the physician. At the same time another idea prevailed, according to which infectious diseases depended upon a certain process taking place in the blood, similar to that of alcoholic fermentation. These ideas assumed a more definite form by the discovery of *Schwann*, that the yeast-cell played an active part in this fermentation. Nevertheless, the germ theory, thus formed, lingered for a number of years, until it received a fresh impulse by *Pasteur's* proclamation, that every fermentative process was called into action by the agency of minute organisms performing the part of a ferment, and that each kind of fermentation depended upon a special kind of fungus. Pasteur's views, of course, were in opposition to the physico-chemical theory of *Liebig* then prevailing, according to which any organic matter, while in a state of decomposition, was able to induce molecular changes in another unstable, fermentable substance. Now, although the assertions of Pasteur, that all fermentations are accompanied by living organisms, have been generally admitted as a fact, the question, whether these organisms are the direct cause of the molecular changes, or whether they are to be regarded as epiphenomena, remains as yet undecided, and the theory of Liebig is, in a slightly modified form still upheld by a number of the most eminent chemists.

The doctrines of Pasteur were eagerly received by many physicians, and applied to the explanation of the cause of infectious

and contagious diseases. The greatest impulse, however, which the germ theory received, was the discovery and description of minute organisms in the blood of animals affected with malignant pustule or splenic fever, by *Pollender* and *Brauell*, in Germany, a subject which, several years later, was more closely studied by *Davaine* in France.

A still more definite form the germ theory received by the examinations of cholera-stools, made by *Klob* during the epidemic prevailing in Europe in the years 1865 and 1866. In examining, namely, the intestinal contents of cholera patients, he discovered a large number of very minute spherical bodies, together with others of a more oblong form, adhering to the outer surface of the epithelial cells. In the intestinal mucus, or in that of the cholera ejections, he also met with these bodies, collected in circumscribed patches in the form of so-called colonies, and imbedded into a gelatinous material. In certain parts of these colonies he observed a number of these bodies, liberated by the liquefaction of their gelatinous envelope, in active motion; while others, united in pairs, or adhering to each other in the form of longer or shorter rows, remained motionless. In the intestinal mucus he met with such colonies formed by oblong, rod-like bodies, either in pairs or, like the former, united into chains of different length.

From these observations, Klob drew the conclusion that all these bodies represented but a single organism in its different phases of metamorphosis, and by further inquiry found them, especially the rod-like form, to correspond with the *Zoglœa termo* of *Cohn*, or *Bacterium termo* of *Dujardin*. Meeting, however, with no other vegetable organism in the ejections, but always with large numbers of these bacteria, he concluded that these forms of fungi, constantly met with in the alimentary canal of cholera patients, never attained a higher development in this locality.

From this it will be seen that these bodies represented the same organisms always met with in stale urine, and other putrid substances, formerly known to physicians under the name of "vibrios," though the knowledge of their true nature and development, and the prominent part which they play in the process of fermentation, belongs to more recent times. They were already

known to *Ehrenberg*, who regarded them as animals, and classed them with the *Infusoria;* but when their nature was rendered doubtful, *Haeckel* placed them, about thirteen years ago, in his newly established natural kingdom of *Protista*, composed of a number of other organisms of doubtful origin. *Naegeli*, a distinguished German botanist, formed them into a separate group of fungi, which he named *Schizomycetes*. In classing these organisms with the lower forms of fungi, however, a difficulty was encountered in the want of similarity regarding the precise mode of their reproduction, for while, with the exception of *Cryptococcus cerevisiæ*, or yeast plant, in all fungi certain typical organs of reproduction are known to exist, none could be demonstrated to exist in the schizomycetes. For, in the latter, the only mode of multiplication observed, consisted in a division of the minute rods in only one direction, while in the fungi, which are likewise represented by linearly arranged cells, the process of multiplication takes place by gemmation, not only in a straight line, but also by the formation of lateral branches. Finally, after having been studied and classified by other distinguished botanists, a second mode of reproduction, to be mentioned hereafter, was discovered in these organisms only a few years ago by artificial cultivation. In accordance with the importance they gained, their nature and their relations to organic substances were studied more closely, leading to the discovery of a large number of new species, and rendering the field they occupy so extended as to form at present a special branch of study in natural history. They have also been subjected to new classifications, especially by *Billroth* and *Cohn*, too extensive to be followed by the practicing physician. But, as in a few instances, particular forms of bacteria are found associated with some special pathological processes occurring within the animal body, and also with the different kinds of fermentation observed in fermentable substances, I deem it proper to give a short sketch of the lower fungi in general, and of those species of the schizomycetes in particular, which have hitherto been observed in association with these processes.

As regards the lower forms of fungi in general, *Prof. Naegeli*,*

*C. v. Naegeli. *Die niederen Pilze* in ihren Beziehungen zu den Infections Krankheiten und der Gesundheitspflege. Muenchen, 1877.

of Munich, one of the first authorities in Botany, divides them in three natural groups, as follows:

1. *Moulds*, representing branched, segmented or unsegmented filaments.

2. *Sprouting fungi* (yeast-cells, saccharomyces, mycoderma, etc.), representing spherical or oval cells, multiplying by means of sprouts from their surfaces, and living either singly or united to form arborescent colonies.

3. *Cleft fungi* (schizomycetes, putrid-fermentation cells, micrococcus, bacterium, vibrio, spirillum, etc.), are spherical cells multiplying by division, and met with either singly or united into rows (rods, filaments), rarely into cubes. They represent the smallest organisms known, the weight of 30,000 millions of the smaller forms would scarcely amount to one milligram.

"The moulds slowly destroy organic substances by consuming them for their nutrition, while the sprouting and cleft fungi act besides as ferment in decomposing large quantities of matter by fermentation."

"The moulds and sprouting fungi are closely related, though, with the exception of one case in which the same fungus (mucor) appears in two forms of vegetation, they have as yet not been directly traced from one form to another. The cleft fungi, however, stand in no genetic relationship to the two other groups, as they can neither produce other forms of fungi, nor take their origin from these."

"The natural species of the lower fungi are not developed in such a manner as to have particular functions of decomposition corresponding with them. If there are different species existing among the cleft fungi, then each of them will cause different decompositions, as, on the other hand, the same decomposition may be caused by different species."

The following classification of the *Cleft fungi* or *Schizomycetes*, will suffice for all practical purposes.

The most simple form in which bacteria are met with is that of minute spherical or oval granules or cells, designated by *Cohn* the *sphæro-bacteria*. These are identical with the *micrococci* of *Hallier*, measuring from $\frac{1}{1000}$ to $\frac{1}{1200}$ mm. in diameter, and are often found aggregated into so-called "zogloea" or colonies, held

together by a gelatinous intercellular substance, or, also, forming bead-like chains. They are motionless, and are sometimes found in putrefying substances in company with other bacteria, and and have also been considered identical with those granules found in the vaccine lymph.

The next group is represented by *bacterium termo* and *b. lineola*. The first presents the form of a minute rod or dumb-bell, has a slow, vacillating motion, and measures from $\frac{1}{360}$ to $\frac{1}{480}$ mm. in length; it is always found associated with putrefactive fermentation. The other is somewhat larger, and exhibits more rapid movements, being found, in company with b. termo and other forms, in stagnant water, as also in putrefying infusions.

The members of the third group are distinguished from the true bacteria by adhering to each other in the form of chains or "linked rods." It consists of *Bacillus*, representing a transversely lined filament, and of *Vibrio*, appearing as a cylindrical and curved filament. There are three species of *bacillus*. The first is *b. subtilis*, a slender thread, about $\frac{1}{20}$ mm. in length, and exhibiting a pausing motion. The second, *b. anthracis*, or *bacterium carbuncolare*, represents a motionless, oblong, and highly refractive body, found in the blood of animals affected with splenic fever, and measures from $\frac{1}{400}$ to $\frac{1}{80}$ mm. in length. The third is *b. ulna*, a stiff filament of $\frac{1}{26}$ mm. in length, and of greater thickness than *b. subtilis*. The *vibrios* are distinguished from the preceding forms by their rotary motion. The *v. regula* represents a flexible thread, from $\frac{1}{100}$ to $\frac{1}{48}$ mm. in length, distinguished by one or two slight curves and its slow motions. The other, *v. serpens*, measuring about $\frac{1}{80}$ mm. in length, is thinner than the preceding, and distinguished by the greater number and regularity of its curves and its more rapid serpentine motion.

The fourth group consists of the *spiro-bacteria*, distinguished from the vibrios by the greater regularity and closeness of the curves of the spiral, and their uniform, cork-screw motion. They are represented by *spirochaete*, to which the spirilla, found in the blood of relapsing fever patients, belong; and by *spirillum*, fine threads of a cork-screw form with a rapid spiral motion.

Nearly at the same time with Klob, *E. Hallier*, a professor of Botany in Jena, had also made a number of microscopical exam-

inations of cholera stools, and for some time agitated the medical world by the discoveries he claimed to have made, consisting in certain spherical and oblong vesicles, filled with minute yellowish and glistening cells or spores, and also of certain spherical masses of minute roundish bodies, held together by a homogeneous gelatinous substance. To the granules or cells of these masses (colonies), adhering in large numbers to the remains of food and to epithelial cells, Hallier applied the name of "Micrococcus." Obtaining almost the same results from other examinations of cholera stools and vomited matters, sent to him from other places, he undertook, by certain methods, to cultivate the fungous elements they contained; and after the lapse of several days, he really found an increase in the forms of micrococcus, cryptococcus, torula, and leptothrix. In some of these cultures only certain forms of fungi appeared, while in others, other forms were observed, such as oïdium lactis, mucor racemosus, and also penicillium glaucum.

These examinations, made upon old material, could not have, as will be readily understood, any important bearing upon our knowledge of the cause of cholera, and for this reason could not but meet with much opposition and criticism on the part of other investigators. Nevertheless, Hallier drew from these observations the conclusion that those minute granules of micrococcus were able to give rise to various forms of fungi, and, moreover, that the particular form of a fungus depended upon the particular material in which it was cultivated. Thus, from each species of fungus micrococcus spores might be derived, which, according to the nourishment they received, would be developed into one or the other species of fungus.

Thus far, the whole question concerning the metamorphosis of one species of fungus into another would have remained botanical in its nature, if Hallier had not extended the bearing of his observations to the field of medical science in asserting that all infectious diseases were caused by the presence of micrococcus spores penetrating into the capillaries of the human organism, in which they multiplied, without ever being developed into a perfect form of fungus. Accordingly, each form of micrococcus would give rise to a particular disease. The same theory he ap-

plied to the process of fermentation, in which, according to the nature of the fermentable substance, a different fungus was produced. The application of Hallier's fungi theory to the causes of infectious diseases met with considerable opposition in Germany; and being finally rejected, made room for the so-called "bacteria-theory," which, though *apparently* supported by a few observed facts, to be discussed directly, is still very far from being established as a truth applicable to all infectious diseases.

Let us now take a glance at those diseases in which bacteria are almost constantly met with in the blood of the affected individuals. There are, in reality, only two in number—viz., splenic fever, and typhus recurrens, or relapsing fever,—to which may be added purulent septicæmia, and pneumo-enteritis of the pig, described by *Klein*. In the latter, however, *no bacteria are found in the blood of the diseased animals;* they can only be obtained from the inflammatory exudations by artificial cultivation. Besides, bacteria have *occasionally* been found in the blood of diphtheritic patients, and also in the vesicles of vaccina and variola. The first and last of these diseases are confined to our domestic animals, though splenic fever is also communicable to man.

In examining these diseases separately, we shall begin with *splenic fever* (malignant pustule, anthrax), the disease in which bacteria were first discovered in the blood of the affected individuals. It is chiefly met with in the sheep, cattle, hogs and horses, but may also be communicated by inoculation to smaller animals, as the rabbit, guinea-pig, mouse, etc., and even to man. It has frequently appeared in the form of an epidemic, spreading over certain districts, but is mostly confined to certain rural *localities*, even particular *pastures* or *stables*. The animals affected with the disease usually die one, two, or three days after the appearance of the first symptoms. One particular form of the disease, called the "apoplectic," is, however, observed, which proves fatal a few hours after its appearance. Death is accompanied by dyspnœa and cyanosis; and the chief anatomical changes revealed by the autopsy are enlargement of the spleen, a laky, viscid, dark-colored blood, numerous ecchymoses in different organs, especially in the heart, hæmorrhagic infiltrations into the areolar tissues,

and also hæmorrhages into the alimentary canal. The particular phenomenon, however, now looked upon as pathognomonic of the disease, and bearing directly upon our subject, are the *bacteria* (bacillus anthracis) almost invariably found in the blood of the affected animals, in which they were first discovered and described by *Pollender*, more than twenty-five years ago, and the discovery corroborated soon after by *Brauell*. But it was not until several years afterward that the subject was taken up, and more closely investigated by *Davaine*, *Colin*, *Pasteur*, and, of late years, by very numerous other observers.

The statements of Davaine, that these bacteria represented the primary cause of splenic fever, and which first attracted the general attention to this subject, met for some years, however, with considerable opposition. Thus, when in 1869 the French Government appointed a commission, consisting of *Bouley*, *Teilhard*, *Lethérisse*, *Maret*, *Tournadre*, *Bonnet*, *Baillot*, *Chauveau*, *Richard*, *Felgéres*, *Messonier* and *Sansom*, to investigate the cause of this disease, Bouley, the chairman, reported as follows: 1. That the disease will be produced by inoculation, even with blood containing no bacteria; 2. That the anthrax blood, containing bacteria, loses its violent properties by dessication, without regaining them by the addition of water, though the bacteria may still be present; 3. The blood of rabbits dying from splenic fever always contained bacteria, whether the disease had been produced by inoculation with blood containing bacteria, or with blood containing some of these organisms. Finally, experiments made by inoculating calves and sheep, showed that bacteria were not always present in the blood, and that the blood proved equally virulent, whether containing bacteria or not.

Now although in the majority of cases of splenic fever bacteria are met with in the blood and tissues of the animals, there have been, nevertheless, a number of cases observed in which they could not be found, and others in which they could only be discovered shortly before or after death, a circumstance which gave rise to many doubts as to whether these organisms were really the primary cause of the disease, or whether they were to be regarded as epiphenomena. These exceptional cases, however, were explained, only a few years ago, by *Koch*, who, by artificially

cultivating the bacteria in the anthrax-blood, discovered that the rod-like, motionless bacterium lengthened into a filament, in which finally a number of very minute bright spores appear. These, when liberated by a disintegration of the filament, develop into other rods, and when introduced into the blood of an animal, rapidly increase by transverse fission. From these observations it was supposed that in those fatal cases of splenic fever in which, in the beginning of the disease, no bacteria had been met with, the germs only had been present, to develop into rods shortly before death.

Notwithstanding this discovery, the question was still disputed, and gave rise to the most animated discussions in the medical-scientific world, and to very numerous investigations upon the subject, with hundreds of experiments upon various kinds of animals. Thus facts were brought forward from one side, to be disproved and contradicted from the other. But in carefully studying the results of the numerous investigations, the impartial observer must confess that in splenic fever, at least, it *appears* that the noxious influence upon the organism must be attributed to the presence of these bacteria. Perhaps the strongest proof of this assertion was forwarded, several years ago, by Davaine, consisting in the fact, afterward corroborated by others, that in pregnant animals the blood of the mother, containing bacteria, will, if introduced into the blood of a second but healthy animal, give rise to the same disease, and moreover cause certain death; while the blood of the fœtus is free from bacteria, and unable to reproduce the disease in another animal or to cause death. The placenta, therefore, performs in this case the part of a natural filter, allowing the liquor sanguinis to pass through it and enter the circulation of the fœtus, while the bacteria with the blood corpuscles are kept behind in the blood vessels of the mother.

Strong as this fact appears to be in favor of the correctness of the bacteria theory relating to splenic fever, it has not been sufficient to dispel all doubts on the question, which will probably not be satisfactorily solved until the origin of these particular bacteria is positively known,—that is, until it has been decided whether the affected animals receive them from the air they breathe, or from the water they drink, or whether they are contained in the

ground of the infected pasture; and, lastly, whether they may not spontaneously be formed from organic granules, set free by the disintegration of some of the tissues within the animal itself, representing the process of "heterogenesis," as proposed by *Bastian*.

As regards their presence in the air, I have not met with any statement relating to it in the literature of splenic fever within my reach; though, regarding this matter, *Bender* suggested, a number of years ago, that these organisms might be contained in the green slime frequently covering not only the wooden troughs, but also the buckets and other wooden vessels containing the drinking-water of animals. *Bollinger*, who closely studied the epizoötic of splenic fever, prevailing some years ago among the domestic animals of the Bavarian Alps, states that in the Alps, as in all other places where splenic fever prevails, the condition of the ground plays a prominent part, inasmuch as the swampy and moist terrain of the Alpine pastures, like that of the valleys, favors the conservation and reproduction of the infectious poison, and that splenic fever never arises primarily from the ground, but is only produced when the latter has been previously impregnated with the poison, and that the so-called miasmatic origin of splenic fever cannot be proved. He thinks that the dung of the diseased animals plays a more important part than is generally imagined.

Davaine made some experiments for the purpose of showing that the splenic fever poison was transmitted from one animal to the other, and even to man, by the proboscis of flies; his statements, however, have been contradicted as well as confirmed by other observers.

Acknowledging the probability that in splenic fever the bacteria, themselves, represent the infectious poison, I forbear citing the numerous experiments, made by Pasteur and others, for the purpose of deciding the question, and the interesting discussions to which they gave rise, but dismiss the subject by reminding the reader of the fact, that these bacteria differ in some respects from those which have been met with in the other diseases mentioned; though *Ewart*,* one of the later investigators of the bacillus an-

* Quarterly Journal of Microscop. Science, April, 1878, p. 168.

thracis, states that micrococcus-forms, bacterium forms, bacillus-forms, and spore-bearing hyphæ are in nowise generally distinct, but that they are simply phases of the same life-history,—a life history doubtless common to all other bacteria.

The next disease to be considered is the *Typhus recurrens*, or so-called "relapsing fever," a contagious and epidemic disease, principally occurring in Germany, Russia and Ireland, but also in India; it is accompanied by affections of the spleen, liver, intestinal glands and kidneys, and by hæmorrhages in different organs. In the fever the pyrexia, lasting from two to six days, is followed by an apyrexia of eight or nine days; then follows a second paroxysm or relapse, lasting four or five days, and terminating in a profuse perspiration. Some cases terminate after the second paroxysm, though in many others other paroxysms are observed to occur. But the characteristic phenomenon of this disease consists in the appearance of minute filamentary organisms in the blood of the patient, first discovered several years ago by *Dr. O. Obermaier*, of Berlin. These organisms, called *spirochaete*, or *spirilla*, represent exceedingly fine and delicate filaments, from $\frac{1}{100}$ to $\frac{5}{100}$ mm. or more in length, appearing and moving very rapidly in the form of a close spiral, similar to a cork-screw. They are only observed in the blood shortly before and during the period of pyrexia, while during the apyrexia or intermission, they are entirely absent; neither can they be discovered in any of the secretions of the body. The singular relation existing between the appearance of these spirilla in the blood and the paroxysm of the fever, naturally suggests the idea that they probably are the true cause of the latter; and the explanation of the appearance and disappearance of these organisms in the blood of relapsing fever patients is, that while the spirilla die at the end of each paroxysm of fever, they leave their spores behind, from which during the apyrexial period, a new brood arises; these spores, however, have *as yet not been discovered*. As regards the transmission of the disease from one individual to the other by inoculation with the blood, the statements are contradictory, though it appears that it can be done, provided the blood is taken from the patient during the period of pyrexia. At the same time, however, the same results were obtained by inoculation

with blood containing *no* spirilla, and taken from cases not differing from the others in severity.

In the July number, 1879, of the *Quarterly Journal of Microscopical Science*, an article, entitled, "The *Microphytes* which have been found in the *Blood*, and their *Relation* to *Disease*," by *Timothy Richards Lewis*, M.D., Surgeon, Army Medical Department, Fellow of the Calcutta University, was published, which originally formed part of the Memoir on the Microzoa and Microphytes of the Blood, appearing as an Appendix to the "Fourteenth Annual Report of the Sanitary Commissioners with the Government of India." This paper, in which Dr. Lewis, who is sufficiently known as an authority on this subject, discusses the whole germ-theory in an able manner, has attracted considerable attention; and since, as regards "relapsing fever," he speaks from personal experience and observation, I shall take the liberty of citing some of his remarks. He puts the question, why we should not at once admit that splenic disease is caused by bacteria rods, and that the aim of treatment should be the destruction of the vitality of these rods; or that recurrent fever is caused by screw-bacteria, and such remedial measures resorted to as tend to destroy them. Answering this question, he says:

"Before such views can serve as the basis of anything like rational treatment, it must be shown—1, either that these organisms, as ordinarily met with, are injurious when introduced into the animal economy; or, 2, that the forms found in disease are in some respects morphologically different from those known to be innocuous—such a difference, at least, as Virchow suggests, as exists between hemlock and parsley."

"With regard to the first point, it has been shown over and over again that all the representatives of the group of fission-fungi can be introduced into the system with the greatest impunity. Not only is their complete innocuousness practically put to the test by every individual at every meal, but observations have been published which have conclusively demonstrated that they may be introduced directly into the blood by injection into the veins, or indirectly, through the lymphatics in the subcutaneous tissue, without the slightest evil consequences. These facts are so well known and generally accepted that it is not necessary to refer to special observation."

"With regard to the second question, however, diametrically opposite opinions are held—all the advocates of the germ theory with very few exceptions, maintaining that the particular organism, in the particular disease in which they are specially interested, is wholly distinct from all others; that is, if the organism happens to be anything more definite than a granule or molecule. The diseases which have been specially cited as being associated with microphytes may be divided, roughly, into two classes, according to the form of the attendant microphyte — the septinous group, consisting of malignant pustule, septicæmia, and the malignant erysipelas or "typhoid" of the pig, on the one hand, and a low form of fever, commonly known as typhus recurrent, bilious remittent, etc., on the other."

"With reference to the organisms which have been found associated with the first-named group, taking malignant pustule as the type, it is to be observed that Mr. Robin in 1865 pronounced the bacteridia of Davaine to be identical with Leptothrix buccalis; and the well-known botanist Hoffman has stated his opinion that they do not differ from like bodies which appear in milk and in meat solutions. Ferdinand Cohn, again, in his observations as to the growth of bodies of the same character in hay solutions, declares that the bacilli in the latter are identical in form and size with those found in splenic disease, and that the various stages in their development correspond in every particular — the only difference which distinguishes them being that, whereas bacillus anthracis presented no movements, the bacillus of hay solutions did. This distinction, as has already been stated, has disappeared."

"Several years ago Dr. Cunningham and myself were, whilst conducting various observations together, frequently struck with the rapidity with which organisms appeared in the blood and tissues of animals after death in this country. The microphytes were not limited to minute spherical and elongated bacteria, but there were also present well marked staves and filaments. In a report submitted by us in 1872, and again in 1874, we drew attention to this matter and suggested the similarity between them and Davaine's bacteridia."

"A short time ago a circumstance occurred which drew my attention in a special manner to these organisms. Mr. Hart, a veterinary surgeon in Calcutta, forwarded to me for examination a little perfectly fresh blood which he had removed from a horse which had died that day of well marked anthracoid disease. His curiosity had been aroused as to the microscopical characters of the blood by perusing an account, in the *Veterinary Journal*, of 'worms' having been found in the blood of horses suffering from a similar affection in the Punjab. A slide was prepared and examined under the microscope at once, but no marked peculiarity could be detected; but when this and other slides were re-examined twelve hours later, having in the meantime been kept under a bell-glass, numerous staves and filaments were observed, which, as to size and form, accurately corresponded with the description of like bodies characterizing the blood in anthracoid disease of Europe."

"Several cultivations were started by adding a little of the blood to fresh aqueous humor. The preparations were then set aside for a few hours in a moist chamber. As the temperature of the atmosphere at that time was generally over 90° F., no special appliances were necessary for supplying artificial heat. The development of the rods into filaments and subsequent appearance of highly refracting oval bodies in the latter, corresponded so completely with what Cohn, Koch, Ewart and others had described, that it is not necessary to give figures of the changes that took place. A series of such cultivations was conducted by transferring a little of the last cultivation to fresh aqueous humor, and so on from one preparation to the other."

"It was then determined to ascertain whether the bacilli found in the blood of animals, which had been set aside for a few hours after death, would manifest, under like conditions, similar changes during their growth. Rats were obtained, killed by means of chloroform, and set aside for from three to twenty-four hours, or longer, according as the temperature of the atmosphere was high or low. The results proved that, almost invariably, bacilli were to be found in their blood, in the spleen and in other organs. On one occasion the rapid appearance of organisms after death was exemplified in a somewhat remarkable manner, and possibly the

mode of death was not without some influence in determining their exceptionally early and plentiful appearance."

"The man employed to procure the rats, determined that he would get a sufficient number to last for some time, and proceeded to a large granary with his rat-traps. Having, however, found that he could procure more than could be accommodated in the cage which he had brought with him, he obtained a large earthen vessel, transferred twenty-seven rats into it, and tied a piece of cloth over the mouth of the vessel. As may be supposed, the rats had perished before he got home—all except one."

"I examined the blood and the spleen of twenty of these rats, within about six or eight hours after their having been caught, and found in each case that there were innumerable bacilli present, in every way morphologically identical with bacillus anthracis. In some of the cases the number was astonishing. They were present chiefly in the form of rods, but here and there some were seen to have grown to such a length as to cover two fields of the microscope."

"This experience tends to give support to the statement made by M. Signol before the French Academy, to the effect that motionless bacilli, identical with those found in carbon, will be found in sixteen hours or less after death in the blood of animals which have been asphyxiated by means of a charcoal fire. M. Signol, moreover, found that eighty drops of this blood would kill a sheep or goat very rapidly, notwithstanding that putridity could not be detected, so far as appearance and odor went; but that bacilli would not be found in the blood of the inoculated animals, either before or immediately after death."

"It has been urged that the microphytes which appear in the blood after death simply make their way into it from the intestinal canal as a result of the breaking down of the tissues. This objection is certainly no longer tenable, for many observers have shown that if some of the organs be removed from the body immediately after death, or indeed isolated from the circulation whilst the animal is still alive and under the influence of chloroform, these organisms will nevertheless appear if the preparation be kept for some hours at a suitable temperature."

In discussing the probabilities in favor of the bacilli and spirilla of the blood being epiphenomena, Dr. Lewis remarks:

"There is one circumstance in connection with the microscopic appearance which these organisms sometimes present, which deserves special mention, as it may serve as an explanation for their sudden disappearance from the blood; and that is, that they may present a well marked beaded or rosary-chain appearance. This feature I was able to observe on one occasion only. The spirilla of the ordinary character were plentiful in this person's blood on the evening previous to the day on which this observation was made, but when examined on the following morning, there were only linked or rosary-chain spirilla in his blood. They were not very numerous, and their movements were not of that *rushing* character ordinarily observed, but conveyed the impression of tumbling across the field."

"The inference which such an observation appears to warrant is, that when the blood acquires a certain as yet undetermined condition, it becomes unadapted to the existence of spirilla, and that the fibrils thereupon undergo segmentation, after the manner of other schizomycetes, and the separate plastides become diffused throughout the circulation; possibly, they then gradually disappear in the same manner as we have seen other plastides (minute bacteria, etc.) disappear after being injected into the circulation. This appears to me the more probable than that they continue in the circulation until the blood re-acquires the state suitable to their growth into fibrils, seeing that the time for their return is so uncertain—it may be two days, may be six days, or a fortnight even, and perhaps they may not return at all. Be that as it may, it is clearly evident that their existence as spirilla is dependent on the composition of the fluids of the body."

"Heydenreich suggests that their disappearance is due to the elevated temperature of the blood at the height of the paroxysm. If that were the case, they ought to become more numerous with the fall of the temperature after death, but it is well known that they disappear exceedingly rapidly when life becomes extinct, in this respect offering a marked contrast to other members of the cleft-fungi group—bacteria and bacilli."

"The fact of their total disappearance immediately after death, probably even before death actually taking place, is very significant, as showing the extremely close relation which exists between them and the blood in *living* tissues, seeing that when the blood is removed from the body, the spirilla will, under favorable conditions, retain their power of locomotion for several hours or days. What these subtle changes of the blood during fever processes may be, chemistry and physiology have not yet revealed; we can therefore only judge of them by the changes of temperature, etc., of the patient; and, in the particular condition under consideration, by the occasional appearance and re-appearance of spirilla, whose presence is manifestly dependent on antecedent changes. That the temperature commences to rise, and that other subjective symptoms are manifested before the appearance of spirilla, testifies to this, for it cannot be that they can exert an influence before they are themselves existent."

"Dr. Charles Murchinson, at the discussion on the germ-theory of disease at the Pathological Society, put this matter very closely when he said: 'The fact that in relapsing fever and sheep-pox distinct forms of bacteria have been found, in no way proves any casual relationship between these diseases and the bacteria, and is readily accounted for by the acknowledged fact that the form taken by many minute growths depends not upon the germ, but upon the nature of the medium in which it grows. Indeed, the observations which have been made on the spirilla of relapsing fever are strongly in favor of this view, for they are present in the blood during the first paroxysm, but disappear before the crisis; are absent during the intermission, but return with the relapse of the fever, and again disappear before the crisis. It seems difficult to account for their appearance and annihilation twice over, except on the supposition that the soil was suitable for their development during the febrile process, and unsuitable when the febrile process was complete.' A like conclusion must be arrived at regarding the bacilli in malignant pustule, septicæmia, and the so-called typhoid fever in the pig, horse and other animals. With regard to the microphytes just named, it may be confidently stated that they are never to be detected in the earlier stages of the disease, but only at a brief period before and after a fatal ter-

mination. To my knowledge they have never been found in the blood of animals which have subsequently recovered; they have always been recognized only as one of the concomitants of impending dissolution."

The next disease in which bacteria have been met with in the blood is *Septicæmia*, representing a depraved condition of the system, and generally observed in connection with grave surgical injuries, such as extensive wounds, etc., or following some operations, a condition characterized by all the symptoms of blood-poisoning. The anatomical changes observed after death are as follows: Early decomposition, skin of a dirty yellowish tint, with numerous livid spots, due to local congestion. Blood of a dark color, fluid, or imperfectly coagulated; small extravasations found in the heart. The lining membrane of the heart and aorta is more or less stained by imbibition of the coloring matter of the blood. The spleen is usually large and soft, very friable and pulpy; the parenchyma of the liver and kidneys is congested or undergoing more or less granular degeneration. In a number of cases, metastatic abscesses are found, especially in the lungs and liver. In surgery, septicæmia is identical with pyæmia, a condition which for a long time was supposed to depend upon the absorption of pus from the surface of the wound into the blood. Though it remains doubtful whether healthy pus could produce this condition, it appears to be generally accepted that the infectious poison enters by the way of the wound, to give rise to a putrid infection of the whole organism, accompanied with or without the formation of metastatic abscesses. But, as in the latter, which are supposed to be formed by embolism, bacteria were found in many cases, this fact was taken hold of by the germ-theorists, and the question arose, whether the septicæmic phenomena were due to the absorption into the blood of a specific septic poison, arising from putrid changes in the pus secreted from the granulating surface of the wound, or even to a putrid decomposition of certain emboli in the blood vessels; or to the noxious influence of *bacteria* contained in the surrounding air and finding their way into the blood through the surface of the wound. The antiseptic dressing of *Lister* is based upon the assumption that the bacteria, settling upon the wound, cause a putrefactive fer-

mentation in its secretion, which, if absorbed into the blood, gives rise to the symptoms characterizing septicæmia.

The idea that septicæmia depended upon the presence of a putrid poison in the blood gave rise to very numerous experiments made upon animals for the purpose of artificially producing this condition by the inoculation or injection of various putrid substances, such as putrefying blood, muscle, urine, etc., containing numerous bacteria, and, as was expected, resulted in the production of the same or similar symptoms and pathological changes in these animals, as characterize septicæmia. While some of these animals died, others remained unaffected. When, however, the blood of these animals, *containing bacteria*, was inoculated into others, graver symptoms, terminating in death, were produced, showing that the putrid poison had increased in violence, but without *being accompanied by bacteria*. Davaine, who extended this successive inoculation upon a very large number of animals, found that the intensity of the poison was increased with each animal through which it passed, and that thus the one trillionth part of a drop would suffice to kill a rabbit. The latter presumption, however, has been refuted by Chassaignac, Onimus, and others. The pathological changes found in animals killed with septicæmic blood are similar to those of septicæmia in man. They are: peritonitis, pleuritis, enlargement of the spleen, pneumonia, hyperæmia of the kidneys, jaundice, and hyperæmia of the intestines. But while bacteria are almost always found shortly before or after death in the blood of animals inoculated with anthracoid blood, it is only an exception to the rule when they are met with in the blood of animals inoculated with septicæmic blood. In fact, all symptoms of septicæmia may be observed, *without the appearance of bacteria in the blood*. The bacteria found in septicæmic blood or abscesses mostly belong to the first group, the sphero-bacteria, and are generally met with in the form of zoglœa-patches. In fact, with the exception of splenic and relapsing fever, it is almost exclusively the micrococcus form that has been met with in other diseases, wherever bacteria have been met with in the blood and secretions, or upon suppurating surfaces. And it is especially this fact which the germ-theorists have hitherto failed to bring into harmony with their theory.

As in splenic and typhus recurrent fever, in septicæmia, also, the question has been whether these bacteria, found in a number of cases, are the direct cause of the disease, or mere accidentally accompanying phenomena; or, whether the symptoms of the disease depend upon the influence of a noxious poison formed within the organism itself. In order to decide this question, various experiments have been made, too numerous to be cited in this place. In these experiments, the most difficult part was to effect a separation of the bacteria from the putrid liquid containing them, and different methods have been followed to accomplish this task, one of which, first resorted to by Pasteur, consisted in filtering the liquid through porous substances, like burnt-clay vessels, by which proceeding the bacteria were left behind in the residue upon the filter. Separate inoculations with the filtered liquid or with the residue, were then made upon different animals, but as the statements of the results of these experiments are so contradictory, I forbear mentioning them; for while, on the one hand (Pasteur) it is stated that the filtered liquid had lost its virulence, we are told by other observers (Anders, Satherthwaite, Curtis and others) that the septic poison, after the destruction of the bacteria, retains its noxious properties. Even injections of putrid liquids, containing bacteria, into the blood of animals, is not always followed by septicæmic symptoms. Thus *Livon*, who injected such liquids into dogs, observed no traces of parasites in the blood, nor any pathological changes in the organs. Davaine found that septicæmic blood loses its virulence by putrefaction, and, moreover, that the blood taken from *living septicæmic* animals had no deleterious effects upon the animals when introduced into the blood.

The micrococcus form of bacteria, besides being met with in the blood and secretions of pyæmic patients, has in a limited number of cases also been observed in diphtheria, especially in the diphtheritic exudate and ulcers, through which, in some instances, they may have found access to the blood; furthermore, in the vesicles or blisters of erysipelas, and even, in exceptional cases, upon the valves of the heart in endocarditis. The experiments and observations relating to the presence and signification of bacteria in the diseases mentioned are very numerous, and the

literature of the subject has become too extensive to be thoroughly discussed in this place. Nevertheless, in order to enable the reader to judge for himself, I shall cite the observations and views entertained by some of the leading pathologists. Thus, *Billroth** frequently found cocco-bacteria in the different normal fluids of the body, especially in the serum of the pericardium; but by no means constantly in the blood of the cadaver of persons who had died of septicæmic diseases, even not in the purulent contents of abscesses, etc. The report is as follows:

"The essential cause of their accumulation was most probably here and there the higher or lesser degree of decomposition of the parts. A conditioning relationship of these organisms to the coagulation of the milk, as well as to the alkaline fermentation of the urine cannot be presumed, as they can be demonstrated, here and there, long before the commencement of the process. It is known that the pus of ordinary, apparently healthy granulating wounds contains numerous cocco-bacteria; also, that the quantity of those present stands in no definite proportion to the height of the fever or other general phenomena of the patient. In the reverse, cocco-bacteria are found in the pus of closed abscesses without the co-existence of fever, while, on the other hand, in similar cases, high fever may exist without cocco-bacteria being detected in the pus. Finally, the presence of cocco-bacteria cannot arbitrarily be asserted from the bad odor of the pus. A very similar relation exists in erysipelas; while, namely, the serous contents of the blister in half of the cases examined contained no cocco-bacteria, they were found several times under the epidermis in non-specific exudations."

"All forms of cocco-bacteria may be produced by artificial cultivation from those parasitic forms found in the organism under different pathological conditions, though none of them would, in its different phases of development, show any essential character differing from those bacteria associated with putrefaction. From this it results that not even a specific mode of appearance is observed on the bacteria met with in the animal organism, opposite to those found in inorganic nature. Still less can this be asserted for definite pathological conditions, or for individual diseases."

**Virchow u. Hirsch*, Jahresbericht f. d. Jahr 1874. Vol. I, p. 353.

"The conditions essential to the regular growths of the cocco-bacteria are only partially known and certainly very complicated; the presence of decomposable organic substances is by no means sufficient, which is proved by the want of correspondence between the commencement of putrefaction and the appearance of these organisms, and also by a want of a definite proportion of the quantitative extent of the latter to the putrefaction. The presence of water and air, as well as a certain passivity and undisturbed position of those parts serving as a place for their germination and proliferation, are undoubtedly essential for the development of the organisms. But even then, a further increase in numbers does not take place, as the experiments of Max Wolff have proved, who failed to observe any septic phenomena after the introduction of fungous spores into the trachea, though he could detect the particles in question in the circulating blood. The numerous statements concerning the presence of bacteria in the blood in this or that disease, also, must be received with great care, as there are other very pronounced cases of septic disease in which they are, at least in entirely fresh blood, certainly wanting. It appears, therefore, that the 'vitality' of the organism exerts a certain conditioning influence upon the destruction, that is, the further growth of the accumulated fungous germs in the circulating blood, as in the secretions and exudations, etc. This fact may be better understood in presuming that the cocco-bacteria are unable to assimilate the albuminous bodies of the tissues in the form in which they exist in the living organism."

"In order that this assimilation may take place, a third hitherto unknown body, which Billroth designates as 'phogistic zymoïd,' must take part, that is, a body which, produced in the course of the inflammation and by this process itself, excites the fluids of the tissues, the blood, pus, etc., in the way of a ferment, rendering them a suitable and accessible medium for the multiplication of the dormant germs contained in it. This phlogistic zymoid acts wherever it comes in contact with healthy tissues, but still more rapidly upon diseased tissues, in exciting them to inflammation and causing their destruction. By the disintegration of the tissues thus induced, the ground becomes prepared for the unlimited proliferation of these parasitic vegetations. In

speaking of the putrid infection, Billroth declares it very probable that the respective poison arrives in the organism in the form of a finished chemical body, exhibiting its effects in proportion to its respective quantity: a conception standing in opposition to the generally adopted fermentation theory."

"*Panum*,* in continuation of his former investigations concerning the relations of the parasitic organisms to putrid processes, published in 1856, renews the question whether the microscopical organisms contained in the ordinary putrefying liquids, can be regarded as the intermediate cause of that group of symptoms designated putrid or septic infection. As he was unable to deprive, by long continued and energetic boiling, putrid liquids of their noxious properties, by which the vegetable organisms contained therein must necessarily be killed,—he arrived at that time at the conclusion that their deleterious properties could not be ascribed to the micrococci and bacteria, but to another lifeless agent, representing a pure chemical body. Before passing to his more recent experiments, corroborating this view, he endeavors to demonstrate by deduction the improbability of the doctrine, according to which the bacteria are the direct septically acting agents. He mentions the fact, confirmed by Magendie, Gaspard and Stich, that the intestinal canal of healthy men and animals contains an extractible substance, which injected into the blood gives rise to all phenomena of sepsis. The circumstance that the latter do not appear under normal conditions, has been made use of as a proof for the molecular, insoluble nature of the poison. But bodily substances also, even psorosperm-eggs, may pass through the epithelium of the intestine, while many soluble substances, as a solution of curare, for example, pass with extraordinary difficulty. Against this supposition is, furthermore, the fact that the duration of the time of incubation in septic diseases does not stand in the reverse proportion to the quantity of the injected liquid, which certainly should be the case. As regards, finally, the clinical symptoms of the septic infection, Panum finds the characteristic points of the course not in the curve of temperature, but in the affection of the intestine, announced by vomiting and

* L. c. p. 354.

diarrhœa; then in the severe collapse and depression of the entire nervous system, and finally in the rapid appearance of putrefaction and the imperfectly coagulating blood. From this it is clear that we are not justified in forming from the symptoms of the poison, and especially from the duration of the course of the affection depending upon the dose and the concentration of the injected liquid, an argument for the essential participation of the at the same time introduced microscopical organisms."

"Against the bacteria-theory, the fact that a putrefying liquid, rendered perfectly free and clear from bacteria by repeated and continued filtration, loses nothing of its septic effects, may be most strikingly brought forward. Of the entire absence of bacteria, Panum became convinced by means of high amplifications. By a repetition of the experiments with putrid liquids, which had been boiled for several hours, he became still more convinced that the distillate obtained from it, though of a bad odor, was not poisonous, while the deleterious effect of the residue was little less than that of the original liquid. The alcoholic extract of the clear filtrate of meat, which had been macerated for four weeks, injected into the blood of a dog, shows only a hypnotic effect. The residue, not extracted by alcohol, however, gives rise to vomiting, inclination to stool, tenesmus, and general depression, from which the animals scarcely recover after the lapse of twenty-four hours. In view of such results, Panum regards it as settled that the putrid poison is no simple extractive substance, but a real chemical body; the latter being the true deleterious agent in the septic processes, while the part of the bacteria is only accidental."

"As regards the origin of this putrid poison, Panum suspects that it is produced by the vital process of the bacteria, perhaps a kind of secretory product (Bergmann). All experience relating to the presence of bacteria in the healthy organism of man, as well as in the diseased, teach us at least that, both bacteria and processes of putrefaction, stand in near relationship to each other. Though, undoubtedly, bacteria also appear in the body with decomposition, their increase always depends upon the cessation of life, be it from local or general causes."

"*Hiller*,* in concert with the results of his former researches,

* L. c., p. 365.

states that in putrefying urine the degree of development of bacteria does not always correspond with the height of the decomposition, but that both rather stand to each other in a reversed proportion. Thus, urine left in an open, or corked, perfectly clean bottle, does not, even after two months, undergo putrefaction; the latter, however, took place in some bottles closed with cotton, and even earlier. Notwithstanding this difference in the results of the experiments, all specimens of urine corresponded in containing a rich vegetation of bacteria after the lapse of only a few days. But this vegetation only attained a certain low degree, and then remained stationary, if afterward a putrid decomposition was not induced. As long as the urine standing open was acid, mycelii of Penicillium glaucum and Torula cerivisiæ would grow, but with the commencement of alkaline reaction, the former disappeared entirely, and the latter partially. As regards the influence exerted by various chemical agents upon the putrefaction, ammonia and carbonate of ammonia remained negative. Phosphate of potassa and soda, as well as tartrate of ammonia, promoted in a high degree the development of bacteria, without producing putrefaction. Specimens of fresh urine placed in a close vicinity to putrefying urine showed extensive masses of bacteria without putrefaction."

"The putrefaction of urine, therefore, cannot be looked upon as a physiological phenomenon of exchange of matter through the bacteria. The vegetation of the latter depends solely upon the supply of assimilable nutritive matter, which, being scanty in fresh urine, is only furnished in sufficient quantity through the putrefaction. As, now, the bacteria are powerless to split the complicated (nitrogenous) combinations in the urine, it requires, in order to nourish them, an agent that induces the decomposition. This agent becomes active through and with the putrefaction, and from this the coincidence, regarding time and extent, of putrefaction and bacteria may be explained.

"In setting aside the decompositions taking place in the urine, experiments with chicken eggs show moreover that bacteria alone are incapable of inducing a putrefactive decomposition in the albumen. From this Hiller concludes the untenability of the vitalistic theory; he is moreover of opinion that the ferments of

putrefaction are represented by most minute proteïn-particles, which, being themselves in a state of putrefaction, are carried through the air to the substratum, to involve it in a similar decomposition."

Although it had been stated by Pasteur, and corroborated by other observers, that no microscopic organisms could be detected in the healthy blood, experiments were nevertheless also made to prove the contrary. Thus, *Fiegel* took pieces of different organs of freshly killed animals, and fastening them to a previously boiled silken thread, plunged them successively into boiling paraffine, until they were covered by a thick layer of this material. Though it was supposed that the boiling heat of the paraffine had destroyed every living germ at the surface of the pieces, and that the layer of paraffine covering them had prevented the access of fresh germs, bacteria were nevertheless found in the interior of the pieces after the lapse of several days.

These experiments, while attracting much attention, were repeated by other investigators; and as the results obtained corroborated the statements of Fiegel, it was concluded that the bacteria themselves, being always present in the blood, were unable to exert any influence upon the production of pathological processes. *Burdon-Sanderson*, also, investigated this matter, by repeating Fiegel's experiments with a slight modification, rather improving the process; and in referring to the experiment in one of his lectures on "The Infective Process of Disease," delivered in the University of London, about two years ago, he says that under the conditions described it seems to him quite impossible to suppose, either that germs could penetrate to the organ (the liver or kidney) from the outside, or that any germ encountered by the organ in its transference from the body of the animal to the basin could escape destruction. If, therefore, bacteria be found, they or their germs must have been there before the organ was plunged into the hot liquid. From these experiments, he then concludes that germs continually enter the blood by the way of the portal circulation, and as no bacteria exist in the circulating blood, the alternatives are that, either the bacteria are formed and immediately afterwards destroyed, or they are not allowed to germinate, because the conditions under which they are placed in the living organism are such as to prevent their development.

Burdon-Sanderson then fully endorses the correctness of Fiegel's statements, and moreover explains the phenomenon according to his own views. But in looking again at the other side of the question, it will be found that *Chiene* and *Ewart* definitely proved the absence of bacteria or any other organism, if removed and examined under a spray of a solution of carbolic acid, together with other precautionary measures, taken during the experiment to prevent the access of these organisms. From these experiments we may learn to receive the statements regarding the presence of bacteria in the living blood or tissues with a great deal of caution.

The last disease in which bacteria have been obtained by artificial cultivation from the secretions of the animals, is *infectious pneumo-enteritis* of the pig, as it has been termed by **Klein*, who investigated it two years ago. The anatomical changes met with in this disease are similar to those already mentioned in connection with splenic fever, consisting principally of lobular pneumonia, ulceration of the mucous membrane of the intestines, the liver, spleen, etc. The results of these experiments showed: 1. That the fresh blood of diseased animals does not, as a rule, contain the virus, as it fails to produce the disease when introduced into a healthy animal. 2. That the fluid as well as the solid lymph of the diseased peritoneum contains the virus in a very active state. 3. That parts of the diseased lung, ulcerated intestines, and diseased spleen contain the virus in a very active state; a frothy, blood-containing matter, found in the trachea and bronchi, also possesses infectious properties, showing that the breath of the diseased animal is charged with poison. 4. That infection is produced by cohabitation with a diseased animal, or by keeping healthy animals in a place whence a diseased animal has been removed.

By some other experiments, Klein furthermore showed that the virus may be cultivated artificially outside the body of an animal, as had been successfully done by Koch, in splenic fever.

The cultivation of the virus consisted in taking a minute portion of the lymph, and inoculating a drop of fresh aqueous humor

* *Quarterly Journ. of Microscop. Science*, April, 1878.

of a rabbit, which, being placed upon a glass-slip and arranged in such a manner as to prevent the access of air, was kept in the incubator for twenty-four hours at a temperature of 33° to 34° C. With a minute portion of this fluid another drop of aqueous humor was inoculated and treated in the same manner; and from the latter a third, representing the third generation. Two animals inoculated with this matter were affected with the disease.

In a similar manner the virus was cultivated from a minute portion of solid lymph of the peritoneum of a diseased animal, and the cultivation carried to a fourth generation. Two animals, having been inoculated with this matter, became smitten with the disease. And, in carrying the cultivation of the virus to the eighth generation, the matter remained still effective.

The microscopical examination of the cultivated liquids showed that they were the seat of the growth and development of a kind of bacterium, resembling Bacillus subtilis of Cohn, and representing a fine delicate rod, thinner than the Bacillus anthracis of Koch.

The interpretation which Klein gives of the results of his experiments appears to me, for several reasons, not calculated to inspire much confidence. Thus, failing in transferring the disease from one animal to another by the inoculation of the blood, he succeeded with the inoculation of the exuded lymph, showing that the virus really existed in the latter. In this paper he omitted to mention whether he had examined the blood and lymph microscopically, and whether, or not, he had detected bacteria in one or the other; but, as he resorted to artificial cultivation, it may be presumed that he did not. Obtaining at last these organisms with their spores, he looks upon the latter as the true cause of the disease, without explaining whence they came. If they had been the true cause of the disease, they must have originally existed in the blood, from which they might have gotten into the secretions, and Klein should have detected them in this fluid as readily as he discerned them in the cultivated liquid. Besides this, he says: "After many failures—owing to the introduction of *Bacterium termo*—I succeeded at last in obtaining, already in the second generation of original virus, a

pure crop of bacillus and its spores." Now, as will be seen, that with the bacillus he also obtained bacterium termo, rendering it very probable that both were derived from the same quarter, that is, from the outside; or, if not, that both, according to Ewart, represented different phases of one and the same organism, and, perhaps, originated in the same manner, as the bacilli in the dead mice and rats of Dr. Timothy Lewis. At any rate Klein did not consider it *impossible* for other organisms to make their appearance in the cultivated liquid, as further on he remarks that "no other organisms appeared in these culvations," *i. e.*, after the bacillus had displaced the bacterium termo. As regards pneumo-enteritis of the pig, therefore, it is more than probable that the peritoneal exudate itself represents the infectious poison.

In comparing the four diseases above described with each other, we cannot but notice the similarity of their accompanying symptoms, and of the anatomical changes observed after death. They are all characterized by an affection of the spleen, lungs, heart and intestines, accompanied by hæmorrhages, ecchymoses, and metastatic abcesses, symptoms depending more or less upon a depraved condition of the blood, and resembling those of typhus fever. Therefore, it may be presumed that the presence of living organisms, found in the blood of the affected men and animals during the last stage of these diseases, is due to the diseased condition of this fluid, affording a favorable medium for their development, and that the diseases themselves are due to the introduction of some specific poison into the blood, representing a product of the diseased organism itself.

That organized bodies may exist in the blood of certain animals without interfering with the normal functions of this fluid is sufficiently proved by the discovery of E. Ray Lankester, in 1871, of a large infusorium in the blood of the common frog of Europe, *Rana esculanta*, which he called *Undulina ranarum;* and, furthermore, by my own, made almost at the same time, of a similar infusorium in the blood of our tree-frog during three successive years. Though these infusoria were quite numerous in the blood of these animals, nothing abnormal could be discovered in the blood of the latter, a considerable number of which I kept under observations for many months.

In addition to the experiments and opinions of a number of distinguished pathologists, which, in the preceding pages, I have brought before the reader, I shall, before dismissing the subject, cite some portions of a remarkable address, delivered, in 1875, to the Pathological Society of London, by Prof. H. Charlton Bastian,* the well known advocate of the theory of "Spontaneous Generation," whose persevering studies into the nature of minute living organisms have not been surpassed by any other investigator. In the course of this address he says:

"I will, however, now briefly enumerate the evidence which seems to me quite sufficient to disprove the probability of the existence of any casual relationship between the lower organisms and the diseases cited at the head of this section, and to establish, on the other hand, the position that the bacteria met with in diseased fluids and tissues are for the most part actual pathological products—that they are, in fact, engendered within the body, or are descendants of organisms owning such an origin, rather than of previously existing organisms introduced from without. It would take too long were I to enter upon a consideration of this evidence. I must therefore content myself with briefly summarizing the principal facts and arguments on which a judgment may be founded."

1. "The experiments of many investigators prove that the alleged causes of diseases may be actually introduced into the blood-vessels of lower animals by thousands without producing any deleterious effects in a large proportion of the cases."

2. "Bacteria, if not actually to be found within the blood-vessels of healthy persons, do nevertheless habitually exist in so many parts of the body in every human being, and in so many of the lower animals, as to make it almost inconceivable that these organisms can be the cause of disease. In support of this statement I have only to say, that even in healthy persons they may be found in myriads in and about the epithelium of the whole alimentary tract from mouth to anus; they exist throughout the air-passages, and may be found in mucus coming from

* The Microscopic Germ-Theory of Disease; being a Discussion of the Relation of Bacteria and Allied Organisms to Virulent Inflammations and Specific Contagious Fevers.—*Monthly Microscop. Journal*, August, 1875.

the nasal cavities, as well as in that from minute bronchi. They exist abundantly amongst the epithelial débris within the ducts of the skin, not only in the face, but in the other parts of the body. Fresh legions of them are also being introduced into the alimentary canal with almost every méal that is taken, whence they may, perhaps, readily find their way into the mesenteric glands, if not farther within the system. And, lastly, in persons with open wounds, bacteria are constantly to be found in contact with such surfaces, especially if the wounds are not well cared for, though the injured person does not necessarily suffer at all in general health."

3. "It is no answer to these difficulties to say that there are distinct species among the lower organisms, some of which are harmless, though others are poisonous (or so-called germs of disease). In support of such an opinion nothing can be alleged save some of the facts whose cause is doubtful; whilst again, such an interpretation may be brought the experiments of several investigators, showing that bacteria are the creatures of circumstance, and modifiable to an extraordinary degree. The last position is even admitted by Professors Sanderson and Lister. The former acknowledges that they are 'the lowest organisms,' and that they are 'much more under the influence of the conditions under which they originate and are developed, than organisms of any other class;' while Professor Lister's own work has compelled him to make an admission which, in the face of facts previously stated concerning the wide distribution of bacteria within the body, seems fatal to a consistent belief in the germ-theory of disease. He says: 'If the same bacterium may, as a result of varied circumstances, produce in one and the same medium fermentative changes differing so widely from each other, as the formation of lactic acid and that of black pigment in milk, it becomes readily conceivable that the same organism which, under ordinary circumstances may be comparatively harmless, may at other times generate products poisonous to the human economy.'"

4. "The considerations now to be mentioned suffice, in my opinion, to complete the discomfiture of the germ-theory as an explanation of the mode of causation of the disease with which we are at present concerned. It is this. It has been shown, on

the one hand, that the virulence of certain contagious mixtures diminishes in direct proportion to the increase of bacteria therein; and on the other hand, it has been equally proved that fresh and actively contagious menstrua lose scarcely any of their contagious or poisonous properties after they have been subjected for a few minutes, when in the moist state, to a temperature which no living units can be shown to survive (212° F.), or after they have been exposed to the influence of boiling alcohol, which is well known to be equally destructive to all recognized forms of living matter. Such facts have been substantiated by Messrs. Lewis and Cunningham, Sanders and others."

"Having said this much in opposition to the germ-theory, let me as briefly enumerate the facts and arguments which seem to me to show the real relations of bacteria and their allies to the diseases in question. I turn therefore to the construction of an opposite doctrine."

"Admitting, in part, the very frequent presence of bacteria in diseased fluids and tissues, I consider that their presence and import should be differently explained. I say I admit the association in part, though I by no means admit it to the extent alleged. Bacteria are not, for instance, to be found in the blood of persons suffering from pyæmia, as might be inferred from former statements of Dr. Sanderson, which I have already quoted. My own experience in this matter seems to be entirely in accordance with that of Professors Billroth and Stricker. Neither do I believe that the presence of bacteria in inflammatory fluids has the significance which Dr. Sanderson attaches to it, since it has been ascertained by myself and others that the exudation fluid of sick persons suffering from disease of a totally different type are often similarly crowded with these lowest organisms, whilst the recent observations of M. Bergeron seem to show that they may be found even in freshly extracted pus from ordinary abscesses occurring in elderly persons."

"Now, it would seem quite obvious that the consistent advocate of a germ-theory of a disease can only successfully maintain such a doctrine if he can show, amongst other things, that bacteria are more capable of altering the character and chemical constitution of fluids of the body than they are themselves prone to

be altered by independently instrated changes taking place in such fluids. It seems, therefore, like unintentionally cutting himself free from the theory to which he has hitherto adhered, when we find Professor Lister, in speaking of the assumed 'special virus of hospital gangrene,' going on to say that 'it is not essential to assume the existence of a special virus at all, but that organisms common to all the sores in the ward may, for aught we know, assume specific properties in the discharges long putrefying under the dressings.' This passage has a similar import to that of a quotation previously made. In both a first plea is assigned to the modifying influence of altered fluids; and however much the correctness of such supposition would tell in favor of cleanliness, free exposure, or even of antiseptic dressings, it is none the less inimical to a consistent holding of the theory on which Prof. Lister has chosen to base his system of treatment."

"But though such statements are adverse to the holding of a germ-theory in the only form in which it may be at all tenable, they are entirely in accordance with my own observations and views. I maintain, in short, that even the very existence of organisms in the fluids and tissues of diseased persons is for the most part referable to the fact that certain changes have previously taken place (by deviation from healthy nutrition) in the constitution and vitality of such fluids and tissues, and that bacteria and allied organisms have appeared therein as pathological products—either by heterogenesis, or by what I have termed archebiosis, or birth direct from a fluid."

"The evidence on which my belief is founded is of this nature: 1. Bacteria and their allies are found in greatest abundance during the life of the individual in connection with dying tissue-elements, and apparently are as plentiful with dying epithelium of the cutaneous ducts, as in parts like the mouth, which are most liable to contamination with organisms from without. Again, they exist abundantly in and about the dying cells of bronchial mucus, although living bacteria appear to be almost completely absent from ordinary air.

"2. The microscopical examination of such epithelial or mucous elements also favors the notion that the contained bacteria are products engendered within such cells rather than mere results of

an external contamination and imbibition. This opinion is based upon the following considerations. Bacteria only appear within the cell when it is obviously dying; and in the case of the epithelium, for instance, they manifest themselves at first as minute motionless particles scattered through the semi-solid substance of the cell, where each particle grows into a distinct bacterium, which still remains motionless, and does not appear to divide for a long time. This is precisely similar to what I have observed over and over again, when amœbæ in vegetable infusions get into an unhealthy condition and become resolved into nests of bacteria. They may exist for days in a state of activity with bacteria in the fluid around them, though none are to be seen in their interior. After a time, however, the chemical constitution of the fluid seems to become no longer suited to the amœbæ; their activity ceases, they remain as almost motionless balls of jelly, and soon multitudes of the minutest particles appear throughout their substance, each of which straightway grows into a bacterium. The former amœba is converted into a mere bag of bacteria, which after a time ruptures, and thus liberates its swarming colony of newly-engendered living units. Multitudes of mucous corpuscles seem to undergo the same kind of change, so that bacterial degeneration takes place in the same manner and is almost as typical amongst them as is fatty degeneration amongst pus-corpuscles. The two kinds of degeneration, moreover, commonly occur side by side in epithelial dèbris. Bacterial degeneration takes place where the vitality of the unity is lowered, but where it is not sufficiently degraded to permit of the still lower and more obviously distinctive process of fatty degeneration; and if any one wishes to see it in perfection let him examine some central portion of the kidney or other internal organ of a warm-blooded animal five days or more after its death."

"3. Bacteria are admitted by nearly all pathologists to be absent from the blood of healthy persons during life, and yet in from eight hours to four or five days after death, according to the temperature of the air at the time, the previously germless blood of individuals may be found to be swarming with these organisms in every stage of growth."

"4. Whereas blister fluid or serum has been shown to be free from organisms in healthy persons, I have ascertained that, given a febrile patient with a temperature of 102° F., one can determine the presence of bacteria, as will, in any blister-bleb which remains intact for forty-eight hours or more, and this, too, when the patient does not suffer from any specific fever, but merely from pneumonic inflammation. I was led to ascertain this fact by finding, about eighteen months ago, myriads of bacteria in all the blebs of a patient suffering from acute pemphigus, with a temperature of 103°."

"5. Lastly, as Dr. Sanderson has shown, a chemical irritant, such as liquor ammoniæ, may be introduced beneath the skin of some of the lower animals in such a way as to 'preclude the possibility of external contamination,' and yet here, amidst tissues which he has shown to be germless, we may thus, within twenty-four hours, determine the presence of swarms of germs and organisms in the pathological fluids effused under the influence of the local chemical irritant."

"This constitutes, as it appears to me, an exceedingly strong body of evidence tending to show that bacteria are pathological products capable of being engendered within the body after death."

The untenability of the germ-theory has been so ably demonstrated by Prof. Bastian in his address as to require no further comment. In explanation of the origin of bacteria in those diseases in which they have been met with in the tissues, he offers his own theory of "heterogenesis" and "archebiosis." In examining and considering this subject more thoroughly and without prejudice it becomes difficult to perceive any impossibility in bacteria arising, at least, by heterogenesis, as Bastian designates that process by which the particles of living tissues, on the eve of the death of the latter, may individualize themselves and continue to live in the form of a low organism. For my own part, I venture to endorse what he says.* "Just as the life of one of the cells of a higher organism may continue for some time after the death of the organism itself, so, in accordance with this latter

* *Bastian—The Modes of Origin of Lowest Organisms.* 1871, p. 15.

view, may one of the particles of such a cell be supposed to continue to live after even cell-life is impossible." That cells do live many hours after the death of the animal or man is corroborated by my own observation which I made in 1867—when examining the epithelium of the mucous membrane of the frontal sinuses of a yellow fever patient eleven hours after death—and consisting in the active motion of the cilia of a single epithelial cell, causing a movement of the cell itself, similar to that of an infusorium. The same phenomenon has been observed on ciliated epithelial cells, even at a longer time after death, by other observers. As regards Bastian's theory of archebiosis, it is more difficult to accept it at present, though the fact that there must have been a time in the history of the earth when organic matter arose from inorganic, and in its turn gave rise to the first living organisms, cannot be overcome. The theory of the development of bacteria from putrefying starch granules has been advanced previously to Bastian by *Hartig*, who has even repeated his former assertions. The origin of the minute moving granules found in the vesicles of variola and vaccina, which *Chauveau* regarded as the carriers of the specific poison, also, would find an easy and reasonable explanation by the heterogenetic theory. We may furthermore refer to the observations of Lewis on dead mice and rats, cited already in the preceding pages; and lastly to some of my own, as follows: In 1867, in examining the brains of yellow fever cases, I put small pieces of the cortex cerebri in small wide-mouthed bottles containing a solution of one-third of alcohol to two-thirds of water. The bottles were filled up to the top, so that when the cork was inserted the liquid would run over, and no air be left within. In examining these pieces four days afterward, I found great numbers of minute organisms in their interior. Some of them represented micrococcus, even zogloæ, and vibrios; but there were others, rod-like forms with highly refractive granules, unknown to me at that time, but which I found afterward explained by the labors of Koch and Ewart. In these cases, however, I shall not preclude the possibility of some of these organisms having adhered to the surface of the brain before they were put into the alcoholic solution.

[TO BE CONTINUED.]

Domestic Correspondence.

ARTICLE VIII.

EDITORS MEDICAL JOURNAL AND EXAMINER: Seeing so many editorials on maternal impressions, brings to mind a case which strongly impressed me with the positiveness of maternal impressions.

I was called on May 23, 1881, to attend a multipara, she being healthy in every respect, but that she had burned her wrists some two months before, and that an old lady had told her that her baby would be marked just as she had been burned, that she had better have a doctor, and then, when the baby was born, the doctor could remove the marks, obliterating all traces of them. Therefore I was called. She was crying when I arrived—afraid her baby would be marked. I told her there was no likelihood of that, and to quiet herself, and not cross the bridge until she came to it. But, lo, when the child was born about two hours after, there was the exact counterpart of the burns on the mother. Although the mother's had entirely healed, the infant's looked like a burn done fifteen or twenty minutes afterward. I treated it just as a fresh burn, and it made a complete recovery without any marks remaining.

Does any one need any stronger evidence of the effect of maternal impression?

S. O. STOCKSLAGER, M.D.

BOONE, IOWA, July 21, 1881.

Society Reports.

ARTICLE IX.

MICHIGAN STATE BOARD OF HEALTH.

The regular meeting of this Board was held at Lansing, July 12, all the members being present, as follows: Hon. LeRoy Parker, of Flint; Rev. D. C. Jacokes, of Pontiac; Henry F. Lyster, M.D., of Detroit; J. H. Kellogg, M.D., of Battle Creek; Arthur Hazlewood, M.D, of Grand Rapids; John Avery, M.D., of Greenville; and Henry B. Baker, M.D., Secretary.

Hon. LeRoy Parker was elected President of the Board for the ensuing two years.

SMALL-POX.

Dr. Jacokes spoke of an immigrant tramp-burglar who came down with the small-pox while confined in the jail at Pontiac. He and another prisoner in the jail were removed to the temporary hospital. The prisoner stole the clothes of the immigrant, and, leaving his own, ran away. Some one then stole the prisoner's cast-off clothes and bedding after supposed disinfection, and by this means small-pox was communicated to more than sixteen persons. He also reported that a second immigrant brought small-pox near Pontiac, but the disease was restricted.

Dr. Kellogg reported that an immigrant, sick with small-pox, had recently been put off a M. C. R. R. train at Battle Creek. He remained about the depot all day before it was discovered that he had small-pox. He was then removed to a tent-hospital.

Dr. Henry reported an outbreak of small-pox, apparently brought by an immigrant Dane, who was vaccinated and not sick himself, to a camp in Montcalm county. The immigrant slept with and gave the disease to a countryman who was vaccinated

before his arrival in this country, six years ago. The disease was light, the man not being confined to his bed at all, and finally he went to a family of five unvaccinated persons, all of whom had the disease lightly. There were other cases in the neighborhood coming from the same source. The immigrant probably brought the contagium in his clothing from some infected city or immigrant on the journey, as he said there was no small-pox on board the ship on which he came, though there were cases of diphtheria on board.

A communication was received from the American Public Health Association, asking the influence of this Board to secure legislation making it a criminal offense for any person to communicate any communicable disease, such as small pox, scarlet fever, or venereal diseases, and giving to boards of health and health officials the same power in the prevention and suppression of other diseases as they now possess in cases of small-pox.

The Secretary presented a resolution of the American Public Health Association, asking the Michigan Board to use its influence to secure general vaccination.

THE CHICAGO SANITARY CONFERENCE.

By direction of the Board, the Secretary had attended the conference of delegates from local and State boards of health, held at Chicago, June 29, for the purpose of devising means for preventing the introduction of small-pox and other diseases by immigrants. As Secretary of the Conference, he had prepared an official report and sent it to the National Board of Health for publication in its bulletin.

The action of the Sanitary Conference, to prevent the spread of small-pox, was indorsed, and resolutions were adopted requesting the National Board of Health to secure, if possible, the vaccination of immigrants before they land in this country; asking the attention of every local board of health in Michigan to the details of the plan adopted at the late Chicago conference; calling upon them to secure a careful inspection of all immigrants entering and remaining within their jurisdiction, and a prompt vaccination or re-vaccination with pure and fresh bovine virus of all persons not protected against small-pox; calling attention to the need of establishing a quarantine at Port Huron; also, ask-

ing the National Board of Health to aid in preventing the introduction of small-pox and other communicable diseases by immigrants landing at eastern ports.

Dr. Baker read resolutions of the Tennessee State Board of Health, indorsing the action of the Memphis Board of Health, commending the inspection service of the National Board of Health as being very much more effective than local quarantines, with less detention and annoyance to commerce.

VACCINATION FOR VARIOUS DISEASES.

Dr. Lyster, Committee on Epidemics and other Diseases, read a translation of two important papers recently published in France, on the causation of certain communicable diseases, which gave details of successful methods of making viruses which can be used in vaccination, and are effective in preventing deaths from these diseases. He received the thanks of the board, and was requested to embody his remarks and so much of the translation as was essential, in a paper for publication.

Dr. Baker had paid some attention to the same subject in connection with diseases of animals, affecting the public health. He mentioned a paper by Prof. Law, of Cornell University, suggesting that these protective viruses all seemed to be made in accordance with a general law, namely, by their cultivation in fluids with access of free oxygen, and this gives us great hope of soon being able to make protective vaccination for many of the most dangerous diseases in animals and mankind.

Dr. Baker reported the investigation of an outbreak of a new disease in England, traced to the eating of American hams. The cause of the disease proved to be a virus which was used to inoculate animals of various kinds and reproduced the same disease in them. From the accounts it seems probable that it is no more nor less than our hog cholera. The symptoms closely resemble in some respects the disease known last winter in this country as "winter cholera."

SANITARY ASSOCIATIONS.

Dr. Jacokes referred to the Pontiac Sanitary Association, and the work it was doing for public health in that city.

Dr. Kellogg reported the formation of a sanitary association

at Battle Creek, as a fruit of the recent sanitary convention held there by this board. Among the subjects brought before the association was that of impure water. He had examined a sample of water used at an eating-house, among the boarders of which there were seven cases of typhoid fever last year. It contained a large amount of organic matter. Also a sample containing organic matter and a large amount of chloride of sodium, used by a family in which there had been much illness.

The request of the sanitary convention at Battle Creek, that this board issue a circular on criminal abortion, was referred to Dr. Kellogg as special committee.

FUTURE PUBLICATIONS.

Drs. Lyster and Baker reported their revision of the document on the Restriction and Prevention of Diphtheria, and different points were discussed, amended and the document adopted. Thirty thousand copies will be printed and the document stereotyped, so that local boards of health may secure any number of copies at cost of paper and presswork.

Dr. Jacokes referred to the great lack of knowledge among those who ought to know, as to what constitutes thorough disinfection. He proposed to remedy this by the preparation of a circular on disinfection.

Drs. Baker and Kellogg were appointed a special committee to prepare a tract on disinfection, which shall give the best method adapted to each disease and to each article to be disinfected, and which shall call attention to the many useless substances now employed for such purposes.

The document heretofore issued on the treatment of the drowned being out of print, it was referred to a committee of revision, with a view to its republication.

Dr. Baker was instructed to prepare a paper on the best methods of constructing hospitals for communicable diseases, avoiding the use of the name "pest-house."

LEGISLATION UPON HEALTH.

Hon. Leroy Parker, Committee on Legislation, made a report relative to public health acts passed by the last legislature, giving the titles of forty-eight acts bearing directly or indirectly on pub-

lic health subjects, mentioning the subject of each act. These acts give increased powers to local boards of health, additional appropriations to the State Board of Health, authorize the board to control State swamp lands to appropriate lands to drain overflowed lands, etc.

The recommendation by Dr. Foster Pratt, of Kalamazoo, for the amendment of the law relative to reporting dangerous diseases, was referred to the Committee on Legislation.

Under the new appropriation made by the recent legislature, the board authorized the purchase of additional meteorological instruments for the use of the board's observers in different parts of the State

WORK IN THE OFFICE.

The Secretary read a report of work in the office, which included a statement of a number of health officers appointed for the present year, beginning April 1, as follows: In townships, 797; villages, 107; cities, 32; total, 936. For the year ending April 1, there were appointed, for townships, 827; villages, 112; cities, 36; total, 975—a difference of 39. It is believed that more than 39 will be returned before the close of this year. The 975 health officers appointed for 1880 made annual reports to this board, as follows: Of townships, 414; of villages, 55: of cities, 14. Clerks of local boards of health have sent annual reports for 1880: From townships, 501; from villages, 36; from cities 7. The compilation of these annual reports is now in progress.

During the quarter the correspondence of the office has been materially increased. This was partly caused by the outbreaks of small-pox in the State, and by the prevalence in some places of diphtheria. In one northern township, where the health officer is not a physician, the local officers applied to this office for a physician to be sent to aid in stopping the spread of the disease; and by direction of the Secretary of the State Board, Dr. Hawkhurst, ex-health officer of West Bay City, went there at the expense of the township, and has reported that the outbreak has been stopped.

The usual number of complaints have been received of sick-

ness caused by flooding rivers for the purpose of running logs in the northern part of the State. In answering these the Secretary has used Mr. Parker's paper on the powers and duties of local boards of health.

EXAMINATION IN SANITARY SCIENCE.

The fee for examination in sanitary science was changed from $10 to $1, the latter sum being deemed sufficient to cover the actual expense. It was voted that applicants unable to be present at this meeting may be examined at the meeting of the Board, October 11, 1881, application to be made to the Secretary, at Lansing.

GLUCOSE SUGAR AND SYRUP.

Several samples of sugar and syrup, manufactured at the Michigan Grape and Sugar Factory, at Detroit, were presented to the Board and partially examined.

NOTICES OF CONTAGIOUS DISEASES TO SCHOOLS.

The Secretary presented samples of notices of contagious and infectious diseases sent by the health officer of Grand Rapids and Tecumseh to the superintendents of schools in those cities, and suggested that if the officer of each city would send such notices to superintendents, it would be a very important public health measure.

PREVENTION OF BOILER EXPLOSIONS.

An account of an experimental boiler explosion, by Dr. T. Lawson, was presented. His view is, that they can be prevented by such a construction of the boiler as will stop the too rapid increase of steam under suddenly-reduced pressure, as at starting the engine, or by the sudden introduction of cold water. Results thus far seem to demonstrate the correctness of his theory.

The Secretary was directed to present hereafter, at each meeting of the Board, a *résumé* of the action of other State boards of health.

After auditing bills and accounts, etc., the Board adjourned, to meet October 11, 1881.

Reviews and Book Notices.

ARVICLE X.—A PRACTICAL TREATISE ON DISEASES OF THE SKIN. By Louis A. Duhring, M.D., Professor of Diseases of the Skin in the Hospital of the University of Pennsylvania, etc. Second edition, revised and enlarged. 8vo, pp. 644. Philadelphia: J. B. Lippincott & Co., 1881.

The revised and enlarged second edition of this work, whose previous issue greatly commended itself to the profession, appears with emendations and additions which largely enhance its practical value. The too prevalent fashion of preparing second editions of a work for the press, has here evidently found no favor. Those who have had reason to know the conscientious and scrupulous care with which the author has devoted himself to the other labor he has set before him, will be prepared to find in these pages a further proof of the excellent quality of his work.

Respecting the more frequently occurring diseases of the skin, the special excellence of this volume has long been recognized in the accuracy of its definitions, in the simplicity and fidelity of its clinical histories, in the absence of untenable theories and of an intolerably redundant nomenclature, and in the value of the therapeutic measures recommended both with a view to general and topical treatment. Naturally, in none of these particulars does the new edition fall short of the excellence of its predecessor. We look over its leaves and find them laden with the fruit of ripe experience—a wise discrimination between observation and theory, and a comprehensive familiarity with the literature of each subject presented.

As regards the diseases of less frequent occurrence, those which more commonly fall under the observation of the expert, we find

that the chapters on dysidrosis, and pompholix, hæmatidrosis, scleroderma, morphœa, atrophia cutis, hypertrophy of the hair, atrophy of the hair, scrofuloderma, syphiloderma, and carcinoma have been those chiefly enlarged by important additions; and it is worthy of note that on those subjects, the contributions of the author to current literature have been in many cases of the greatest value.

The new articles all embrace subjects of special interest to Americans, as the rare diseases to which the attention of the reader is called are yearly of more frequent observation here, probably not because they are of increasing frequency, but because the labors of American dermatologists have directed such attention to them that they are more frequently recognized. It was said of Thoreau, by Mr. Emerson, that he expected one day to see the *Victoria regia* growing in the vicinity of Concord, and certainly the number of cutaneous diseases recognized abroad and hitherto supposed to be of the greatest infrequency in America, is rapidly diminishing. The new descriptions found here, relate to uridrosis, phosphorescent sweat, urticaria pigmentosa, dermatitis circumscripta herpetiformis, pityriasis maculata et circinata, dermatitis exfoliativa, dermatitis papillaris medicamentosa, dermatitis gangrænosa, dermatitis capillitii, fungoid neoplasmata, tuberculosis cutis, podelcoma, ainhum, perforating ulcer of the foot, and myoma cutis.

Doubtless there are those who will glance through a list of these names and be conscious of a sensation of dismay. The terms are many of them unfamiliar to the fairly-well educated physician. The subjects to which they refer are to him of small practical moment, he may conclude. Possibly he will dismiss the whole with a too common reflection, that dermatology is wedded to its cumbrous nomenclature and mysterious refinements above the level of the average intelligence. It is worth while to consider this reproach for a moment.

For it is a reproach which has not lacked public expression. The annual meetings of the American Dermatological Association have been criticised in our medical journals, in consequence of the time thus spent in discussion of rare forms of cutaneous disease; and it is sufficiently common to hear medical men of

position and education admit their ignorance of the general subject of skin diseases, attributing this to the large number of rare forms of such maladies and the confusion existing with respect to their designation.

Now, without stopping to charge these sins of nomenclature upon all other departments of scientific labor, we cannot fail to remember that, especially of late years, the terms employed in chemistry and perhaps more particularly in connection with new operations upon the female genitals, have been of the most complicated and perplexing character; is is, however, needful to note that the newer terms employed by the dermatologist are those connected with distinct pathological processes or the objective evidences of such processes, while the others to which we have referred are more generally the terms demanded by the refinements of art, or by the requirements of exactness in technical expression. To know the rule in dermatology, one must know the exceptions; to be able to pronounce with precision upon the most common of diseases, one must be positive in the exclusion of every other. The exceptions, though rare, are visible alike to physician and patient, and clamorously assert their identity in their behavior. They betray their differences also in public, and to the eye of the individual who is not consulted as to their nature. Again, it is always necessary to get rid of the doctrines respecting ghosts, before one is in position to discuss a fact of nature. To establish the fact of a new or rare cutaneous disease, one is placed under the necessity of clearing away an incredible quantity of rubbish.

Look for a moment at the title given here "Dermatitis Exfoliativa." The other names mentioned by our author under this head, as employed by writers, are, "General Exfoliative Dermatitis," "Recurring Exfoliative Dermatitis," "Desquamative Scarlatiniform Erythema," "Recurrent Acute Eczema," "Acute General Dermatitis," "Recurrent Exfoliative Erythema," and "Scarlatiniform Exfoliative Dermatitis." Here unquestionably there is need of a single term, by which may be understood the varieties of exanthem described by such writers as Baxter, Féréol, Fagge, Pye-Smith, and, among the Americans, by such writers as Bulkley and G. H. Fox. Our author might have

added here, the names also of Guibout, of Paris, and Jamieson, of Edinburgh, had the recent papers of these last-named gentlemen appeared before the book went to press. Surely this is a subject requiring attention in a treatise devoted to the consideration of cutaneous disease.

Here, again, we find the evidences of our author's conservatism. He restricts the use of the term we have given, to certain unusual and occasionally grave forms of disease, characterized by an acute erythematous, more rarely vesicular or bullous, inflammation, localized or generalized, accompanied by a more or less marked febrile disturbance, accompanied or followed by varying degrees of desquamation or exfoliation of the epidermis, and marked by a tendency to relapse. The disorder he thus describes is to be distinguished from the recognized varieties of eczema and psoriasis, and from pityriasis rubra and pemphigus foliaceus. But how are these distinctions to be established, especially in face of the fact, that "much diversity of opinion exists as to the true nature of the cases * * * and it is difficult to determine from the reports whether they illustrate the same process or different diseases." Difficult, indeed, it is; one is strongly tempted to disregard alike authorities and minor differences of fact under the circumstances, and to agree with Jamieson that the term "general exfoliative dermatitis" should be made to include the very diseases from which we are here told that the conditions included by that term should be carefully differentiated.

Now it is in just such periods, when our knowledge of the different phenomena displayed under different circumstances by a single pathological condition is widening and deepening, that a wise conservatism is requisite. True, there is a wide distinction between typical cases of pemphigus foliaceus, for example, where the dried contents of a collapsed bleb furnish the material of the papery flakes cast off from the surface, and that disorder characterized merely by "bullous inflammation followed by various degrees of desquamation of the epidermis with a tendency to relapse." Yet the evidences of the existence of intermediate forms between these extremes are not wanting, and Jamieson (*Edinburgh Med. Journ.*, April, 1880, p. 879) cites several cases which it would be exceedingly difficult to assign exclusively

to the one category or the other. One such has also been reported by ourselves (CHICAGO MED. JOURN. AND EXAM., February, 1881), under the title Pityriasis Rubra, where there was coexistence of very extensive epidermal desquamation, with febrile accesses of fatal termination, and where the surface exhibited marble-sized projections, which were found, post-mortem, to contain a creamy pus, and which served to give a particular character to the malady. We are not yet ready for a distinct recognition of all these rare and severe cutaneous manifestations as members of a single family, and yet, if the signs do not fail, to that complexion we shall eventually come. Our author has wisely given us a provisional recognition of these typical states, under the title "Dermatitis Exfoliativa."

We could in this way go over all the interesting ground traversed here for the first time, by one well qualified to pronounce with decision at every step, but we must be content by reminding those who find it necessary to consult a treatise of this sort, of the importance to themselves of possessing a brief yet precise description of each of the rarer cutaneous diseases, especially when it is requisite to come to a diagnosis by the processes of exclusion. It is for these reasons that we take especial pleasure in commending Dr. Duhring's book to the practitioner as well as to the student of medicine, and it is probably true that the marked success of the first edition was based upon its value in just this particular. Of it can be said now, even more confidently than on its first appearance, that it is the best treatise in the English language on the subject of diseases of the skin. As a text-book, it stands without a rival, and as a monument to the author's painstaking and indefatigable industry, it is one upon which he can well be congratulated. It is the production of books like this, which has brought to the profession in this country a degree of recognition and respect abroad which we could not in any other way have attained, and it is this which has held up to our own countrymen a standard of literary excellence in authorship which has proved of inestimable value.

The new illustrations in the chapter on anatomy of the skin are very creditable drawings by Dr. Van Harlingen, and serve well to exhibit the relations between the protoplasmic bodies in

the mucous layer, formerly described as hanging together by spines or prickles at their points, and clearly shown by Heitzmann to be generally connected by a thread-like network of living matter, traversing the lifeless cement substance between the epithelia.

The typography of the book is beyond criticism, and in other respects the publishers have done their part in its production with a most commendable success.—*American Journal of the Medical Sciences.* J. N. H.

ARTICLE XI.—LECTURES ON DISEASES OF THE NERVOUS SYSTEM, ESPECIALLY IN WOMEN. By S. Weir Mitchell, M.D., Member of the National Academy of Sciences (and of ten medical societies), etc. With five plates. 12mo, cloth, pp. 238. $1.75. Philadelphia: Henry C. Lea's Son & Co., 1881. Chicago: Jansen, McClurg & Co.

This is a very ill chosen title for a contribution to the study of some phenomena related to hysteria, chorea, and epilepsy. The five lithographic plates are five tables exhibiting the barometric pressure, atmospheric temperature, and other conditions of the weather in their relation to chorea and infantile palsy. They are of doubtful value. This monograph is pleasantly written, contains not one technical term, treats of some of the most common events of life; all this with little pretension to scientific researches, and will find its sphere of usefulness as a means of advertising among nervous people, at least this idea will suggest itself to many readers.

The author reports some very interesting cases that came to him from Indiana, Kentucky, Ohio, Mississippi, Canada, Maryland, Rhode Island, Massachusetts, New Jersey, Connecticut, etc., and he cured several of them. One must not judge from this however, that this production of a specialist, and "common sense doctor" is devoid of merits. It treats of some subjects never before so keenly investigated as by Dr. Mitchell, whose manner of treatment is highly commendable and too often overlooked by the "busy practitioner." No doubt it will benefit the latter to peruse in an abstract the substance of these lectures,

since he will not have time to read such prolix literature. The author's words are preserved as much as possible, and so also the order of chapters.

PARALYSES OF HYSTERIA.

Causation.—It is most common among the ill-fed, needy, and worried; people that have lost money, and those who lack distinct purposes and aims in life. The palsy may be partly real, partly pure weakness, partly loss of power from want of belief in being able to move. In practice it is usual to find two or three causes acting to assist one another. Four cases of hemiplegia on the left were met to one on the right, and the face was not usually involved. All the senses are liable to be blunted. Profound emotions act as a cause.

Symptoms.—You will see women with a low, whining, bleating voice that is by itself a tell-tale of the kind of will-less ataxia which seems to cripple the mind no less than the body. These are the hard cases to relieve. In fact, even with the best of self help from the patient, the cure of any one of these cases is a long and arduous course of education. All hysteria is not after a time within control of the sick person, and no human sagacity will suffice to enable us to predict results from profound emotions on the patient.

Treatment.—The cures of these cases are to be made by a slow, steady, hopeful training of the will powers through every-day effort, which needs some caution not to err in the way of excess. There is no short cut; no royal road.

HYSTERICAL PARESES.

In some cases of this, nerve conduction is retarded, and gives rise to such incoördinate action as they exhibit. This is made worse by excluding the guiding influence of vision. It is limited for the most part to the more complex movements. This is common in grave hysteria.

Course.—The history of hysteria is sometimes one of years, and in certain cases, either at the outset or after more or less of the strange drama of this disease has been played, the patient falls into a state of inertness of mind and body, which I am forced, for lack of a better name, to call hysteric paresis. This is one of those

disorders which adds many recruits to that large class which some one has called "bed cases," and which are, above all things, distinguished by their desire to remain at rest. They are liable to have relapses.

Treatment.—In grave cases it is best to teach the patient to creep, which is an easy and natural mode of training for the walk. The progress to creeping is easy, then comes the lesson of kneeling and pushing a chair; and last, that of standing in a corner or by a chair. No drug has a direct value. An occasional benefit is derived from induction currents. What you have to do is to rectify with care positive uterine troubles, to treat defects of nutrition, to relieve the anæmia so apt to exist in hysteria, to see that every function is well cared for; and last, not least, to learn what need there is to alter the moral surroundings of your patient, and then with kind and patient care, and an unbinding will, to bring about the changes she may seem to require.

MIMICRY OF DISEASE.

Etiology.—The elements out of which these disorders arise are deeply human, and exist in all of us in varying amount, while many of the determining and conditioning factors come from accidental, or, at least, external agencies. The hysterical state, the nervous temperament, general nervousness, neurasthenia. In the over-sensitive, emotional and timid. It is with some people a morbid birth-gift, with some an inheritance, and in its worst shapes it is made or acquired by misuse of alcohol or tobacco, or tea or coffee. It comes from failing health. Such a state is usually slowly created; but a permanent state of general nervousness may be evolved by the accident of a moment, when precedent conditions favor it. Then every one has some capacity for mentally influencing or disturbing functions of the body which usually are not under the control of volition. In some hysteric or nervous states this power becomes enormously increased. There exists in all of us, feebler in age and more potent in childhood, a tendency to automatic and unconscious imitation which is the parent of a good deal of the mimicry of disease. In this disease, indeed, we find women, and men too,

passing into a mental state in which they are really much like people in dreams. Their power to reason on the phenomena of the senses leaves them, and what they conceive to be the case takes the place of that which is. This is to be met with, to some extent, in all grave hysteric cases. In these cases the emotions are no more under control than in a dream, and the pains are little. A case recovered after a few days, but sometimes the return to health and healthy ideas exacts a long and tiresome trouble. Some children enjoy the important rôle of being ill.

Treatment.—The need for care in discussing symptoms before nervous women or children, the necessity of early apprehension of the true state of things in simulated disease, and the wisdom of acting decisively when once we are sure of our ground are obvious.

Unusual Forms of Spasmodic Affections in Women.—The woman who habitually has hysterical spasms has something wrong with her general health. She is anæmic, or has lost general tone; there is nervous exhaustibility. If we can relieve it we cure the convulsions.

Tremor, Chronic Spasms.—Tremor is an expression of weakness in old age, fatigue, convalescence, organic diseases, or toxic states, transient emotions, fear, excitement, anger, or grief; disappointed love, abuse of alcohol, etc. It is most persistent as a result of nervous wounds. There is no abrupt recovery. The treatment largely consists in experimenting with these cases. Hypodermic injection of atropia locally in nervous spasms is useful. So is massage, extension by splints and apparatuses.

Chorea of Childhood.—Stormy weather, spring time and schools influence the disease, which has a tendency to recur. Puberty is causative also. This is essentially a disease of cities, and is rare in the Negro. Arsenic is the best remedy.

Habit Chorea—also a disease of childhood—consists in rapid and repeated twitching of some muscles; rapid winking, shrugging of the shoulder, etc. Most common in girls from seven to fourteen years of age. There has been some fall from the plane of health. A cause cannot always be detected. The child's restraining power is not well exercised. Good and careful diet,

light gymnastics, no school, gentle aperients, full doses of arsenic, form the best treatment. Hypodermic injections of Fowler's solution without the lavender, thrice a week, in doses rising from two to twelve drops, is the best method of administration.

Disorders of Sleep in Nervous or Hysterical Persons.—This corresponds as much to epilepsy as habit chorea does to chorea. Self control, and some fatigue will relieve it.

Vaso-motor and Respiratory Disorders in the Nervous or Hysterical.—The *pulse* is apt to be as rapid as 90, 100, 130 a minute, and the extremities cold. Flushing with tumultuous heart action, and semi-lateral sweating. The *respiration* has been observed at 10, 15, and even 96 in a minute. Loss of power in the crico-arythenoid muscles is the common type of hysterical aphonia. The patient may be able to sing well, although unable to speak. She may speak aloud during sleep. It is well to recommend them to speak with a full chest. Tonics, rest, and full feeding are indicated. Relapses are common. There is a sense of choking, and difficulty to swallow. This has led some to observe long fasts and not take food nor liquid for as long as twenty-seven days.

Gastro-Intestinal Disorders of Hysteria.—Cases of persistent hystero-epilepsies, and of severe contractions, are not frequent in this country. The author observed five cases of hysteria lasting from fifteen to twenty-five years, all bed-ridden. Few cases died. Feed the patient, empty the bowels, give exercise, baths, tonics. It is nearly always some trick of the stomach or gastro-intestinal tract which sooner or later baffles or perplexes us. Anorexia, regurgitation, spasms on taking food by the mouth or by the rectum. Seclusion, massage, skimmed milk diet, are all useful. Absence of all possible use of body and mind. Iron in large doses, and cod-liver oil, when well borne, are useful in hysteria with anæmia. The hysteria of puberty is the most favorable. But women in good condition, fat and ruddy, with sound organs and good appetites, but ever complaining of pains and aches, and liable to a variety of hysterical phenomena, cannot usually be cured. H. D. V.

Items.

OFFICIAL LIST OF MEDICAL OFFICERS AND ACTING ASSISTANT SURGEONS of the United States Marine Hospital Service, with their Stations, July 1, 1881:

Supervising Surgeon-General.—John B. Hamilton, Washington, D. C.

Surgeons.—Ernest Hebersmith, San Francisco, Cal.; P. H. Bailhache, National Board of Health; John Vansant, Boston, Mass.; W. H. H. Hutton, Detroit, Mich.; T. W. Miller, Chicago, Ill.; Walter Wyman,* Cincinnati, Ohio; W. H. Long, Louisville, Ky.; R. D. Murray, Memphis, Tenn.; C. S. D. Fessenden, New York, N. Y.; George Purviance, Pittsburgh, Pa.; H. W. Sawtelle St. Louis, Mo.; H. W. Austin, New Orleans, La.; J. M. Gassaway, Philadelphia, Pa.

Passed Assistant Surgeons.—Henry Smith, Norfolk, Va.; G. W. Stoner, Portland, Me.; J. C. Fisher, Washington, D. C.; John Godfrey, Mobile, Ala.; C. B. Goldsborough, Baltimore, Md.

Assistant Surgeons.—Fairfax Irwin, Wilmington, N. C.; F. W. Mead, Port Townsend, W. T.; H. P. Cooke, Galveston, Texas; H. R. Carter, Cairo, Ill.; W. H. Heath, Buffalo, N. Y.; F. J. O'Connor, Evansville, Ind.; F. D. Porter, Chicago, Ill.; John Guiteras, Key West, Fla.; W. A. Wheeler, Charleston, S. C.; J. A. Benson, St. Louis, Mo.; C. E. Banks, San Francisco, Cal.; D. A. Carmichael, New York, N. Y.; S. T. Armstrong, New Orleans, La.

Acting Assistant Surgeons.—J. M. Allen, Milwaukee, Wis.; W. B. Banks, Rockland, Maine; H. G. Bates, New Berne, N. C.; C. C. Berry, Portland, Maine; R. D. Bibber, Bath, Maine; F. N. Blount, Pensacola, Fla.; J. E. Bready, Dubuque, Iowa; G. B. Case, Cleveland, Ohio; Byron DeWitt, Oswego, N. Y.; L. B. Edwards, Richmond, Va.; A. W. Fisher, Toledo, Ohio; J. P. C. Foster, New Haven, Conn.; W. M. Griffiths,* Louisville, Ky.; A. C. Hamlin, Bangor, Maine; L. W. Hodgkins, Ellsworth, Maine; S. B. Hunter, Machias, Maine; J. M. Kercheval, Nashville, Tenn.; H. E. Mereness, Albany, N. Y.; J. D. Mitchell, Jacksonville, Fla.; Charles Ottilie, La Crosse, Wis.; R. H. Pease, Chicago, Ill.; C. T. Peckham,† Boston, Mass.; W. H. Pope, Fernandina, Fla.; T. T. Price, Tuckerton, N. J.; S. D. Robbins, Vicksburgh, Miss.; Elmer Small, Belfast, Maine; J. G. Stanton, New London, Conn.; W. D. Stewart, Vineyard Haven, Mass.; G. H. Stone, Savannah, Ga.; D. H. Strickland, Erie, Pa.; H. S. Taft, Marquette, Mich.; W. H. Taylor, New Bedford Mass.; J. H. Vandeman, Chattanooga, Tenn.; M. F. Wentworth, Portsmouth, N. H.; C. A. Wheaton, Jr., St. Paul, Minn.; J. E. Wood, Elizabeth City, N. C.

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* Temporary duty as medical officer revenue-bark "Chase."

† Temporary duty at Cincinnati during the absence of Surgeon Wyman.

‡ Temporary.

OFFICIAL LIST OF CHANGES OF STATIONS AND DUTIES OF MEDICAL OFFICERS of the U. S. Marine Hospital Service, April 1, 1881, to June 30, 1881:

Bailhache, P. H., Surgeon. Detailed as Chairman Board of Examiners. April 5, 1881.

Wyman, Walter, Surgeon. Detailed for temporary duty as medical officer revenue-bark "Chase." May 31, 1881.

Long, W. H., Surgeon. Detailed as member Board of Examiners. April 5, 1881.

Murray, R. D., Surgeon. To proceed to Memphis, Tenn., assume charge of the service at that port, and inspect the service at Vicksburg, Miss. April 8, 1881.

Purviance, George, Surgeon. Detailed as Recorder Board of Examiners. April 5, 1881. To proceed to Richmond, Va., as inspector. April 30, 1881. Detailed as Chairman Board of Survey, to examine applicants for admission to the Revenue Marine Service. May 10, 1881.

Doernig, E. J., Surgeon. Granted leave of absence for thirty days from April 21, 1881. April 2, 1881.

Austin, H. W., Surgeon. Granted leave of absence for thirty days from May 5, 1881. April 2, 1881.

Gassaway, J. M., Passed Assistant Surgeon. To proceed to Philadelphia, Pa., and assume charge of the service, relieving Passed Assistant Surgeon Stoner. April 7, 1881.

Smith, Henry, Passed Assistant Surgeon. To report to Chairman Board of Examiners. April 25, 1881.

Stoner, G. W., Passed Assistant Surgeon. To proceed to Portland, Maine, and assume charge of the service, relieving Surgeon Doering. April 7, 1881.

Fisher, J. C., Passed Assistant Surgeon. Detailed as Recorder Board of Survey, to examine applicants for admission to the Revenue Marine Service. May 10, 1881.

Wheeler, W. A., Assistant Surgeon. Granted leave of absence for thirty days (he providing a substitute,) from July 7, 1881. June 23, 1881.

Carmichael, D. A., Assistant Surgeon. To proceed to New York, N. Y., and report to Surgeon Fessenden for duty. April 7, 1781.

RESIGNATION.

Doering, E. J., Surgeon. Resignation accepted by the Secretary, to take effect May 20, 1881. April 2, 1881.

PROMOTION.

Gassaway, J. M., Surgeon. Promoted to be Surgeon from May 21, 1881. May 16, 1881.

EXAMINATION PAPERS OF THE ILLINOIS STATE BOARD OF HEALTH.

CHICAGO, JUNE 29, 1881.

Obstetrics—By A. L. Clark, M.D.

1. Give the mechanism of the Occipito-Sacral position.

2. Define placenta previa, and give—*a.* Its diagnosis. *b.* Prognosis to mother and child. *c.* Treatment.

3. How will you Diagnose Pregnancy from Ovarian Tumor?

4. Give the contra-indications for the use of Ergot.

5. How can you diagnose Fibroid Uterine Tumor from Flexion of the Uterus?

6. What blood-vessels are contained in the Umbilical Cord?

7. What are the sympathetic signs of Pregnancy?

8. Give Pathology, Diagnosis, Prognosis and Treatment for "hour glass contractions" of the Uterus.

9. What stage of labor is attended with the greatest danger, and what is the danger?

10. Give the dangers in—*a*. The first stage of labor. *b*. The second stage of labor. *c*. The third stage of labor.

Chemistry—By A. L. Clark, M.D.

1. What is the number of Simple Chemical Elements?

2. What is Equivalent Weight?

3. Give the Chemical Symbol for Antimony, and give an Antimonial Preparation sometimes used in medicine.

4. Explain the combustion and flame of a candle.

5. Under what circumstances will a galvanic current be formed?

6. What is the specific heat of any body?

7. What takes place when any soluble Salt of Iron is prescribed or mixed with most vegetable Infusions or Tinctures?

8. Give the Chemical Symbol for the Monoxide of Nitrogen, and suggest the uses of the compound.

9. What is Specific Gravity?

10. Name ten Elementary Substances.

Gynæcology—By R. Ludlam, M.D.

1. What is the most frequent of all the Uterine displacements?

2. Give the diagnosis of Hysteria from Epilepsy.

3. How would you know a case of Ulceration of the Uterine Cervix from one of Cervical Endometritis?

4. What are the symptoms of Laceration of the Cervix?

5. What is the prognosis in Pelvic Cellulitis?

6. When, if ever, do Fibroid Tumors become malignant?

7. Is Leucorrhœa a symptom or a disease?

8. Give the symptoms and treatment of Prolapse of the Ovary.

9. What are the indications for the use of the Sponge Tent?

10. Name the diseases in which Menorrhagia is an almost invariable symptom.

General Pathology—By R. Ludlam, M.D.

1. What is Anæmia?

2. Give the general pathology of Fever.

3. What is the difference between Hypertrophy and Atrophy?

4. What do physicians understand by compensating Hypertrophy? Give an illustration.

5. Define the word diathesis, and name the most important Diatheses.

6. Describe the different stages of Cerebral Apoplexy.

7. Is Dropsy a symptom or disease, and why?

8. What is the pathology of Hemi-anæsthesia?

9. In the hepatization of Pneumonia, if chloride of sodium is deficient in the urine, where do we find it?

10. In intermittent Fever when would you apply the thermometer in order to get the highest range of temperature?

Hygiene—By J. H. Rauch, M.D.

1. What kinds and what amount of food should be furnished those sick with acute diseases? When and how should it be given?

2. What are disinfectants? Name the best. How do they act as such? How and when should they be used?

3. How would you prevent or limit the spread of Typhoid Fever, Diphtheria, Scarlatina?

4. In a case of Typhoid Fever, where would you look for its probable source or origin?

5. What effect would the drainage of the level prairies of the State have upon health?

6. How would you ventilate the school room? How much air space should each pupil have?

7. How would you resuscitate from the asphyxia of Drowning, Coal Gas, Chloroform or Ether?

8. What is Trichinosis? How can it be prevented?

9. Which do you prefer, humanized or non-humanized vaccine virus, and why?

10. How would you diagnose Small Pox from Measles, Scarlet Fever, Chicken Pox?

11. How would you prevent the spread of Small Pox?

12. How would you render privies and water closets innocuous?

13. How do you account for the increased mortality of the past six months?

14. What effect, upon the public health, will result from the recent overflows in this State?

15. Why should the registration of Births, Deaths and Marriages be enforced?

Medical Jurisprudence—By J. H. Rauch, M.D.

1. In a case involving legal questions, how would you conduct a post-mortem examination?

2. How would you conduct the examination of an insane person for commitment to an insane asylum?

3. State under what circumstances you would deem it necessary to hold a coroner's inquest.

4. How would you differentiate between Drunkenness and Apoplexy?

5. To what extent are physicians liable for the bad results of treatment of a fracture?

Practice of Medicine—By John McLean, M.D.

1. Is Pneumonia a specific fever, or a local inflammation with fever as a result? Give reasons why.

2. What are the varieties of Pneumonia?
3. How would you treat a typical case of Catarrhal Pneumonia?
4. How would you diagnose Bronchitis from Pneumonia?
5. How would you treat Bronchitis?
6. How would you diagnose Pleuritis from Bronchitis? From Pneumonia?
7. How would you treat Acute Pleuritis?
8. What would be your treatment if effusion followed Pleuritis?
9. What is Diphtheria? How would you treat a case?
10. How would you diagnose Measles from Scarlet Fever?
11. How would you treat Measles?
12. How would you treat Scarlet Fever?
13. What are the symptoms of Acute Gastritis?
14. How would you treat Dysentery?
15. How would you diagnose a case of Morbus Brightii?
17. What pathological condition is found in Cerebro Spinal Meningitis?
18. How would you treat a case?
19. What is the supposed cause of Malarial Fever?
20. How would you treat a Remittent Fever?

Materia Medica and Therapeutics—By J. H. Rauch, M.D.

1. What are—[1] Infusions, [2] Tinctures, [3] Fluid Extracts, [4] Waters, [5] Solutions?
2. What are—[1] Ointments, [2] Cerates, [3] Suppositories, [4] Spirits, [5] Oleo-Resins?
3. Give full Latin officinal name, opium strength, and doses of—[1] Black Drop, [2] Dover's Powder, [3] Laudanum, [4] Extract of Opium. [5] How does the Deodorized Tincture of Opium differ from Laudanum?
4. [1] Name and give the origin of the three officinal kinds of Aloes. [2] Which sort is best for medical use, and why? Name and give doses of three Aloëtic preparations. [4] Give the composition of Compound Cathartic Pills.

Sources, active principles, three preparations, and doses of each of the following drugs:

5. Belladonna
6. Capsicum.
7. Cinchona.
8. Senna.
9. Cinnamon.
10. Dose of—[1] Acid Hydrocyanicum Dilutum, [2] Camphora, [3] Chloral, [4] Elaterium, [5] Ext. Ergotæ Fluid, [6] Ext. Hyoscyami, [7] Iodoformum, [8] Oleum Ricini, [9] Tinctura Aconiti Radicis, [10] Tinct. Veratri Viridis.
11. Various methods of treating acute rheumatism. Expectant, Alkaline, Salicylic, Theories and result.
12. Giving details of carrying out the above.
13. Hypnostics—Opium, Chloral, Bromides, Lactucarium—Peculiarities of each.

14. Cathartics—Mention five different kinds. State peculiarities of action, and occasions on which you would wish to use each.

15. Name the Cinchona Alkaloids. What are their comparative values?

Physiology.

1. What is the specific gravity of normal urine?
2. How is gastric juice produced?
3. How is the peristaltic motion of the bowels produced?
4. How many sounds has the heart? And how do you distinguish them?
5. Is bile a recrementitious or excrementitious product, or both?
6. What are the functions of the pneumogastric nerve?
7. Describe the difference between a serous and mucous membrane.
8. What organ of the body commences growing about the 45th year?
9. What function does the pancreatic juice perform?
10. Why is venous blood darker than arterial blood?

Anatomy.

1. Name the principal fluids of the body.
2. Describe the circulation of the blood in the adult.
3. State the number of bones composing the human skeleton, and name those of the cranium, face and vertebral column.
4. State number and names of the several muscles of the eye?
5. What are the principal divisions of the human brain?
6. Name and describe the membranes of the brain and spinal cord.
7. State number and names of the cranial nerves.
8. Describe the sympathetic nerve.
9. What structures are cut and what artery is endangered in the operation for strangulated hernia?
10. Describe the regions of the abdomen, and state their contents.

Surgery.

1. Define malignant and benign tumors, and give examples of each.
2. How diagnose dislocation of humerus from fracture?
3. How reduce subglenoid dislocation of humerus?
4. State how you would diagnose, dress and treat a simple fracture of the leg.
5. When is a wound said to heal by first intention, and what conditions are necessary to such a result?
6. What are the indications for tracheotomy, and the dangers attending the operation?
7. What would you do in fracture of the skull without signs of depression?
8. What conditions and indications would demand the amputation of an injured limb?
9. Give general directions for local and constitutional treatment after amputations?
10. How would you administer the anæsthetics, ether and chloroform, and what do in case of suspended respiration during their administration?

SOCIETY MEETINGS.

Chicago Medical Society—Mondays, Sept. 5-19.
West Chicago Medical Society—Mondays, Sept. 12-26.
Biological Society—Wednesday, Sept. 7.

CLINICS.

MONDAY.

Eye and Ear Infirmary—2 p. m., Ophthalmological, by Prof. Holmes; 3 p. m., Otological, by Prof. Jones.
Mercy Hospital—2 p. m., Surgical, by Prof. Andrews.
Woman's Medical College—2 p. m., Dermatological and Venereal, by Prof. Maynard; 3 p. m., Diseases of the Chest, Prof. Ingals.

TUESDAY.

Rush Medical College—3 p. m., Dermatological and Venereal, by Prof. Hyde.
Cook County Hospital—2 to 4 p. m., Medical and Surgical Clinics.
Mercy Hospital—2 p. m., Medical, by Prof. Quine.

WEDNESDAY.

Chicago Medical College—2 p. m., Eye and Ear, by Prof. Jones.
Rush Medical College—2 p. m., Medical, by Dr. Bridge; 3 p. m., Ophthalmological and Otological, by Prof. Holmes; 3:30 to 4:30 p. m., Diseases of the Chest, by Dr. E. Fletcher Ingals.

THURSDAY.

Chicago Medical College—2 p. m., Gynæcological, by Prof. Jenks.
Rush Medical College—2 p. m., Diseases of Children, by Dr. Knox; 3 p. m., Diseases of the Nervous System, by Prof. Lyman.
Eye and Ear Infirmary—2 p. m., Ophthalmological, by Dr. Hotz.
Woman's Medical College—3 p. m., Surgical, by Prof. Owens.

FRIDAY.

Cook County Hospital—2 to 4 p. m., Medical and Surgical Clinics.
Mercy Hospital—2 p. m., Medical, by Prof. Davis.

SATURDAY.

Rush Medical College—2 p. m., Surgical, by Prof. Gunn; 3 p. m., Orthopœdic, by Prof. Owens.
Chicago Medical College—2 p. m., Surgical, by Prof. Isham; 3 p. m., Neurological, by Prof. Jewell.
Woman's Medical College—11 a. m., Ophthalmological, by Prof. Montgomery; 2 p. m., Gynæcological, by Prof. Fitch.
Daily Clinics, from 2 to 4 p. m., at the Central Free Dispensary, and at the South Side Dispensary.